

FEBRUARY, 1957

**C**ommercial  
**F**ertilizer  
and PLANT FOOD INDUSTRY

**Getting MORE  
Nitrogen into  
Superphosphate**

**SEE PAGE 19**

Are  
you good  
at  
figures?

### EXAMPLE 1

#### Valve Bags for Granular or Pulverized Materials

If you increased filling  
production from 12 per  
minute to 15 or more  
per minute—without  
paying a penny more  
for sleeve or special  
insert bags... what  
would be the percentage  
of increase—and dollar  
savings to you—  
per ton—per hour?

### EXAMPLE 2

#### Open Mouth Bags for Free Flowing Materials

If you increased filling  
production from 15 per  
minute to 20 or more  
per minute—without  
paying a penny more  
for your open mouth  
multiwall bags... what  
would be the percentage  
of increase—and dollar  
savings to you—  
per ton—per hour?

## KRAFT BAG CORPORATION

*Gilman Paper Company Subsidiary*  
630 Fifth Avenue, New York 20, N. Y.  
Daily News Bldg., Chicago 6, Ill.



—check and mail today—

- ☐ We are interested in Example 1.
- ☐ We are interested in Example 2.
- ☐ We are interested in both examples.

NAME OF COMPANY \_\_\_\_\_

ADDRESS \_\_\_\_\_

CITY \_\_\_\_\_ ZONE \_\_\_\_\_ STATE \_\_\_\_\_ PRINCIPAL \_\_\_\_\_

PRODUCT MFD \_\_\_\_\_

**We have the bags and  
the packer to effect such  
savings—or more!**

*Give us the time to give you the facts!*

Dependable as a service for  
3 generations. Exclusive  
Sales Agents for the Kraft-  
packer Automatic Filling  
Machine and one of the larg-  
est integrated producers of  
multiwall bags with plants  
in St. Marys, Georgia and  
Gilman, Vermont, manufac-  
turing every type of multi-  
wall bag in use today!





**The door to service**

## ...swings wide at SOHIO

When you need fast, dependable service and accurate technical information from your nitrogen supplier, you can be sure you'll be pleased with the service from Sohio.

Ammoniation a problem? Sohio's technical service staff is always ready to help. They'll be able to offer you unbeatable flexibility in ammoniation — with Sohio's full product line.

If costs are your concern, Sohio's

cost analysis service can help ferret out the cause of many a profit-robbing problem.

Since dependable delivery is always important, Sohio is prepared to extend you every service — fast delivery from huge storage and loading facilities, speedy truck service, and five rail lines out of Lima.

So if you need nitrogen, call Sohio . . . and get service.

*We're serious about service at Sohio*

**SOHIO CHEMICAL COMPANY**

FT. AMANDA RD., P. O. BOX 628, LIMA, OHIO

### SOHIOGEN® SOLUTIONS

A complete line of products for fertilizer manufacture

#### Ammonium Nitrate — Ammonia Solutions

- |            |  |
|------------|--|
| Sohiogen 1 | The standard solutions familiar to the fertilizer industry |
| Sohiogen 2 |  |
| Sohiogen 3 |  |
| Sohiogen 4 |  |

#### Urea — Ammonium Nitrate-Ammonia Solutions

- |             |   |
|-------------|---|
| Sohiogen 10 | 41 to 44% nitrogen solutions containing 10 to 15% urea to help mixed goods conditioning |
| Sohiogen 11 |   |
| Sohiogen 12 |   |
| Sohiogen 15 |   |

#### Urea — Ammonia Solutions

- |             |  |
|-------------|--|
| Sohiogen 21 | Urea and ammonia in 45% nitrogen solutions, winter and summer grades |
| Sohiogen 22 |  |

#### Urea — Ammonium Nitrate Solutions

- |             |   |
|-------------|---|
| Sohiogen 31 | 28 and 32% nitrogen solution used to add supplemental nitrogen to mixed fertilizers |
| Sohiogen 32 |   |

#### Urea — Water Solution

- |             |   |
|-------------|---|
| Sohiogen 40 | 40% urea solution, liquid source of supplemental nitrogen |
|-------------|---|

#### Sohio Anhydrous Ammonia

#### Sohio Aqua Ammonia

#### Sohigro Urea

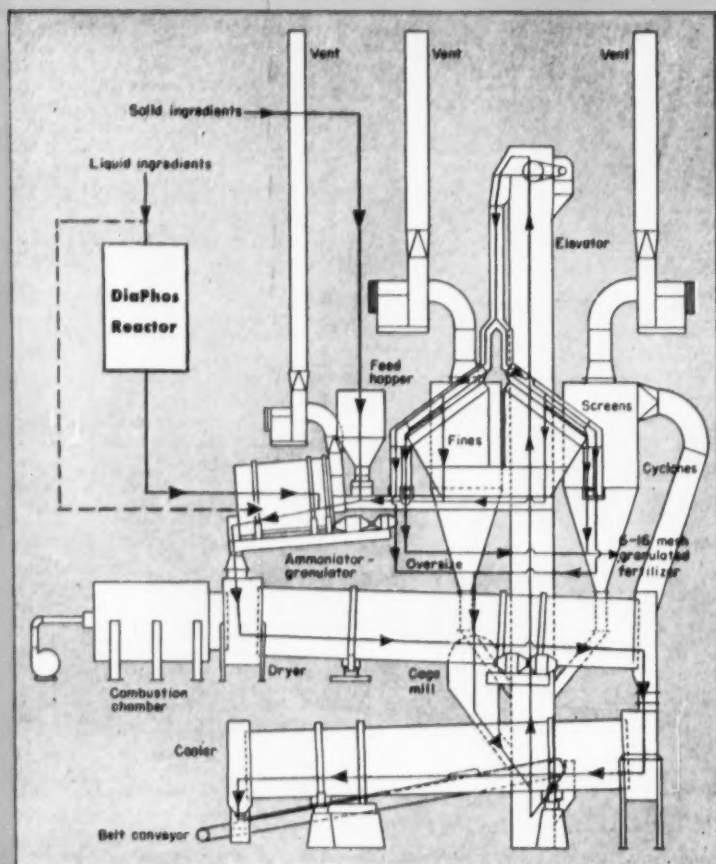
A 46% nitrogen, prilled urea fertilizer material, bagged or bulk supplemental source of nitrogen

### NEW CONCENTRATED SOLUTIONS

Sohio Chemical Company offers a complete line of concentrated type solutions — tailored to fit your particular needs. We invite your inquiries for technical assistance on how these new solutions can offer attractive economies in your operations. You'll save freight and labor. Reduced moisture content lowers drying costs; improves storage quality.



# YOU CAN MANUFACTURE AMMONIUM PHOSPHATE by the NEW **WEATHERLY DiaPhos PROCESS**



Study this flow sheet, and you'll see how  
the Weatherly DiaPhos Process lets you make:

**WATER SOLUBLE** ammonium phosphate, containing up to 72 units  
of plant food from phosphoric acid and other  
liquid and solid materials.

**GRANULATED,** by the thoroughly proven Weatherly Process for pro-  
duction of closely size-controlled granules.

**POWDERED.** This plant will, of course, also produce non-caking, free-  
flowing powdered fertilizer, using the lowest cost raw  
materials.

**ALL THREE FORMS OF  
DEMANDED FERTILIZER  
WITH SIMPLE CHANGE  
IN PLANT SET-UP**

The Weatherly DiaPhos Process is unique  
in letting you switch quickly and easily  
from one product to another as demand or  
other conditions vary. No other process  
has this flexibility.

It puts you in the ammonium phosphate  
business with the least capital investment.

It is easy to add to existing plants, to  
engineer into present or future designs.

*We will be glad to  
talk to you about it.*



**The D. M. WEATHERLY COMPANY**  
*Industrial Engineers and Builders*

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**C**ommenting  
**F**reely

by **BRUCE MORAN**

This was written at the exact hour when the President flew from Washington on his tour of the drought stricken areas of the Southwest, where no rain has fallen in 7 years, where the soil is so depleted that, even if rain did fall, nothing much would come of it, where the people are so depressed that one wonders why they still struggle against the elements. What Ike will say or do while there, and after he comes back, I do not pretend to know.

But I do know, as all our industry knows, that no farmer can be saved unless water can reach his land. And I know, as you know, that the case for the small farmer even then is pretty hopeless.

Vol. 94 No. 2

Established 1910

February, 1957

# **C**ommercial **F**ertilizer and **PLANT FOOD INDUSTRY**

Subscription rates: United States, \$3.00 per year; 5 years, \$12.00.  
 Foreign \$5.00 per year.

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**There is a need for bigness, the coordination of business management, to cope with the problems that lie beyond the drought. There is need for sound farm practices, to have the land ready for the day when the rains come again.**

**The Government can do something about that, —but only in a paternal sort of way. The real job is to change the small farms into big ones . . . and that takes a change in the thinking of the farmers themselves.**

**In any event, it is good that the President himself goes down there, to dramatize the problem, and make us all think about it. Much good can come of that, and we of the fertilizer industry will, I am sure, be ready to do what we can to implement sound thinking in that area, as in all agricultural regions.**

*Now - for direct application . . .*

**highest quality..  
granulated triple super**



*Just one trip across the field with this dustless, easy-to-handle, granulated 0-45-0 will make a repeat customer out of a trial user. Cash in now on spring sales.*

### *Builds customer satisfaction and repeat sales*

You'll like the compliments you'll get after your customers have tried your new 0-45-0 from International for the first time.

Look at typical comments from users of this high-quality triple:

"It sure goes on easy." (You bet it does! It's granulated for easy going through any fertilizing rig.)

"Pleasure to use." (Yes . . . and just one downwind trip across the

field will prove it to anyone . . . will build more repeat sales than a dozen sales talks.)

"Saves time and money." (Now your customers can avoid breaking up lumps in the bag or stopping in the middle of a field to kick a clogged-up rig. Easy to handle . . . just fill the fertilizer hopper and push off. Easy to put on.)

What's more, agronomists can

tell you the high availability of this superior product delivers results that build farmer satisfaction and repeat sales. The reason: special processing and manufacturing care produces a triple that resists reversion in the soil . . . supplies growing plants the phosphorus they need when they need it.

Call or write International today for samples and complete details.

free-flowing...top-performing  
that sells itself on sight

*bagged under your own label...  
shipped direct to your dealers\**

Here's a new triple super you'll be proud to add to your own line of fertilizers... the new, granulated 0-45-0 from International Minerals and Chemical.

This superior triple can be shipped in bulk, or International will be happy to have it bagged in adequate quantities under your own label... ship direct to your own dealers, too, if you like.

Here's what this can mean to you:

- A top-quality triple super that carries your own private label and complements the rest of your line.
- A modern, easy-to-use, top-performing triple super that will bring you increased

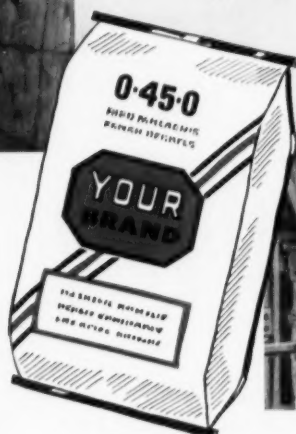
customer satisfaction and plenty of repeat sales.

The unbeatable convenience of distributing this high-quality product under your own brand name direct to your dealers without touching a single bag.

What's more, you'll find that dealing with International is a pleasure. You'll appreciate the friendly cooperation from International's transportation department... the fast service... and the reliability of supply.

See your International triple-super sales representative soon for complete details on minimum order requirements, price and delivery information. He'll be glad to show you samples. And one look at this new 0-45-0 will show you why you can't get a better deal than this new triple super now available for direct application sales.

*\*subject to minimum  
order requirements*



Profit now from this superior 0-45-0. Bagged under your own brand name.

*Superior texture of this new triple super, put up in your own bags, stores without caking. It's granulated for easy going through any fertilizer attachment.*

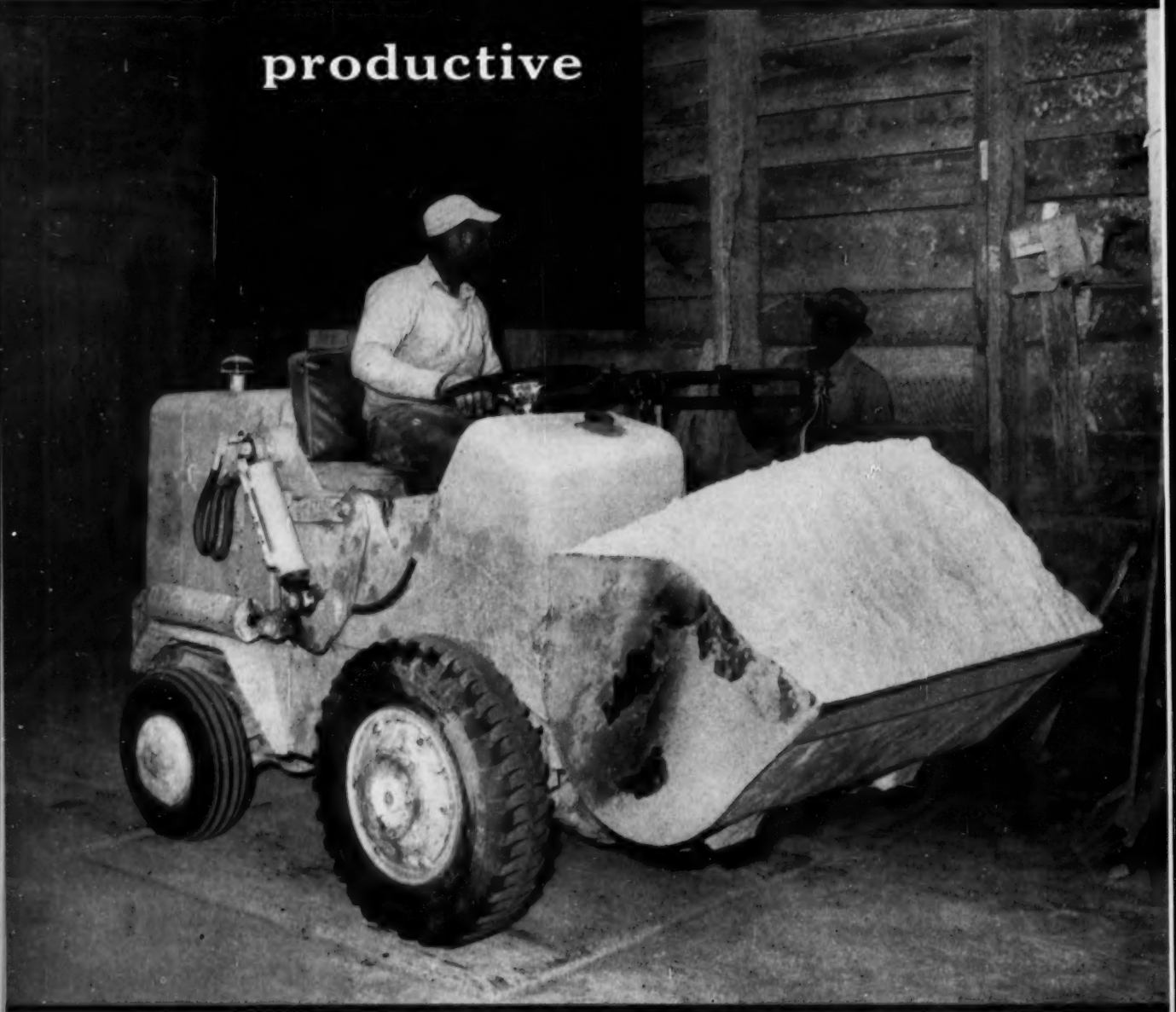


PHOSPHATE CHEMICALS DIVISION

**INTERNATIONAL MINERALS & CHEMICAL CORPORATION**

General Offices: 20 North Wacker Drive, Chicago 6

make your  
operators  
more  
productive



*"Our new 'PAYLOADER' does the work of two machines," says Ernest Dickerson, Valiant Fertilizer Company.*



# these new **PAYLOADER**<sup>®</sup> models ...deliver more per man hour

More competitive markets, tighter labor supplies and rising labor costs are conditions that industrial management will probably have to contend with for some time to come.

How to keep up with production demand and hold down production costs in spite of these three pressures? One proven solution is to increase output per man by providing your operators with the most modern, most productive machines available.

In terms of tractor-shovels for bulk or loose-material handling this means "PAYLOADER" tractor-shovels. Because they are built by the pioneer and leader in the tractor-shovel industry there are *more* "PAYLOADER" units in use than all other makes combined. Many industrial plants that have been "PAYLOADER" users for years tell us that it has paid them to replace older units with the new "PAYLOADER" models from the standpoint of greater production alone — that they not only handle more tonnage than earlier models but are way ahead of other tractor-shovels in design and the features that make them **MORE PRODUCTIVE**.

## A Complete Line with Exclusive Features

The complete "PAYLOADER" line includes sizes for every purpose, including big 4-wheel-drive types up to 2¼ cu. yd. bucket capacity. Model HA (18 cu. ft.) and HAH (1 cu. yd.) are front-wheel-drive types especially suited to fast material handling indoors and in yards. Rear-wheel steering and compact design gives them short-turning ability for easy maneuvering in close quarters. Exclusive one-lever bucket control on the model HA and power-steering on the larger HAH contribute greatly to ease of operation. Their distinctive roll-back bucket action gets full loads quickly and, combined with hydraulic load-shock-absorber, enables them to move full loads faster without spillage — enables them to dig more, carry more and deliver more tons per hour than heavier machines with larger engines. Lift fork, pusher fork and floor sweeper attachments are also available to increase their usefulness. Your nearby "PAYLOADER" Distributor wants to prove on *your* work what a modern "PAYLOADER" can do to move more materials at less cost.



Model HAH handling Super phosphate at Longaker Mills. "Moves 60 tons per hour on a 100 foot haul — does the work of 3 older units."



"New HA loads faster and handles more material than older machines — operate easier with increased operator safety," says A. W. Stone, Superintendent.



**PAYLOADER<sup>®</sup>**  
MANUFACTURED BY  
**THE FRANK G. HOUGH CO. LIBERTYVILLE, ILL.**  
SUBSIDIARY—INTERNATIONAL HARVESTER COMPANY



## THE FRANK G. HOUGH CO.

702 Sunnyside Ave., Libertyville, Ill.

Send full data on "PAYLOADER" tractor-shovels as follows:

- ☐ Model HA (18 cu. ft.)      ☐ Model HAH (1 cu. yd.)  
☐ Larger models to 2¼ cu. yd.

Name

Title

Company

Street

City  State

34

## JUST AROUND THE CORNER *by Vernon Mount*

OUR BOOM is a people boom. 1957 will see 2,800,000 more population in the US. The next five years will add 14,000,000 more. By 1975, 60,000,000 more will be added to the grand total. That's a lot of folks who will eat a lot of food.

FIFTH PLATE is what this has been called for quite a while, but this adds up to more than a "fifth plate"—because it is a 35 per cent increase in population. And all who contribute to filling these new plates, however they may feel about the present market, had better start thinking about taking care of all those extra mouths when the time comes.

THIS IS NO NEWS to regular readers of this department . . . just a reminder that 1975 is a year closer, and plenty to do in the meantime.

Yours faithfully

*Vernon Mount*

# **“DOLOXIDE”**

*Pulverized Magnesium Calcium Oxides*

Used by nearly all fertilizer plants to condition . . .

- Alkaline Grades
- Pulverized Ammoniated Grades
- Granulated Ammoniated Grades

THE MOORES LIME CO., SPRINGFIELD, OHIO, U.S.A.

Baltimore A.A.C. Co. Plant  
at Baltimore, Maryland



## Another source of AA quality products

To meet your "quick" or "long term" requirements for a variety of chemicals, depend on the A.A.C. Co. You can count on uniform quality and guaranteed purity through rigid laboratory control. You'll get expert assistance from skilled research people in developing "specials" for unusual projects. And you can count on prompt service.

### CHOOSE FROM THESE AA QUALITY<sup>®</sup> PRODUCTS FOR FARM AND INDUSTRY

Florida Phosphate Rock • Superphosphate • AA QUALITY Ground Phosphate Rock  
All grades of Complete Fertilizers • Gelatin  
Bone Products • Fluosilicates • Ammonium Carbonate • Sulphuric Acid  
Phosphoric Acid and Phosphates  
Phosphorus and Compounds of Phosphorus

**THE American Agricultural Chemical Co.**

GENERAL OFFICES: 50 CHURCH STREET, NEW YORK 7, N. Y.

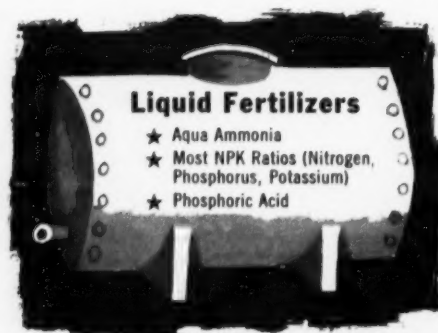
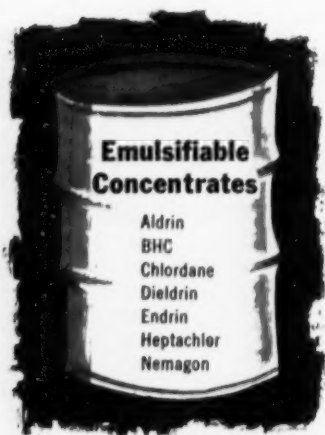
### OTHER A. A. C. CO. SALES AND SERVICE POINTS

Alexandria, Virginia  
Baltimore, Maryland  
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Columbia, South Carolina  
Detroit, Michigan  
E. St. Louis, Illinois  
Fulton, Illinois  
Greensboro, North Carolina  
Henderson, North Carolina  
Humboldt, Iowa  
Havana, Cuba  
Montgomery, Alabama  
Norfolk, Virginia  
No. Weymouth, Massachusetts  
Pensacola, Florida  
Pierce, Florida  
Saginaw, Michigan  
Savannah, Georgia  
Spartanburg, South Carolina  
Three Rivers, New York  
Washington Court House, Ohio  
Agricultural Chemicals Ltd.  
Fort Chambly, Quebec  
London, Ontario  
Port Hope, Ontario



*with practically no limitations*

# NOW! You Can Field Mix Liquid Fertilizers and Pesticides



with the Versatile **EMCOLS** 

**H-A**

**H-B**

 Emulsifiers

### Further advantages of this novel system:

1. Emulsifiable pesticide concentrates are compatible in liquid fertilizers regardless of sources of NPK (Nitrogen, Phosphorus, Potassium).
2. Emulsions are easily formed with minimum agitation.
3. Maximum flexibility is provided for controlling pesticide-fertilizer dosages in mixed crop requirements.
4. Pesticide concentrates are also suitable for conventional aqueous spray applications in case of carry-over stock.

*All these advantages make this novel system economically attractive to formulators, applicators and growers.*

*serving many other industries with dozens of EMCOL emulsifying agents... especially the pesticide and herbicide fields.*



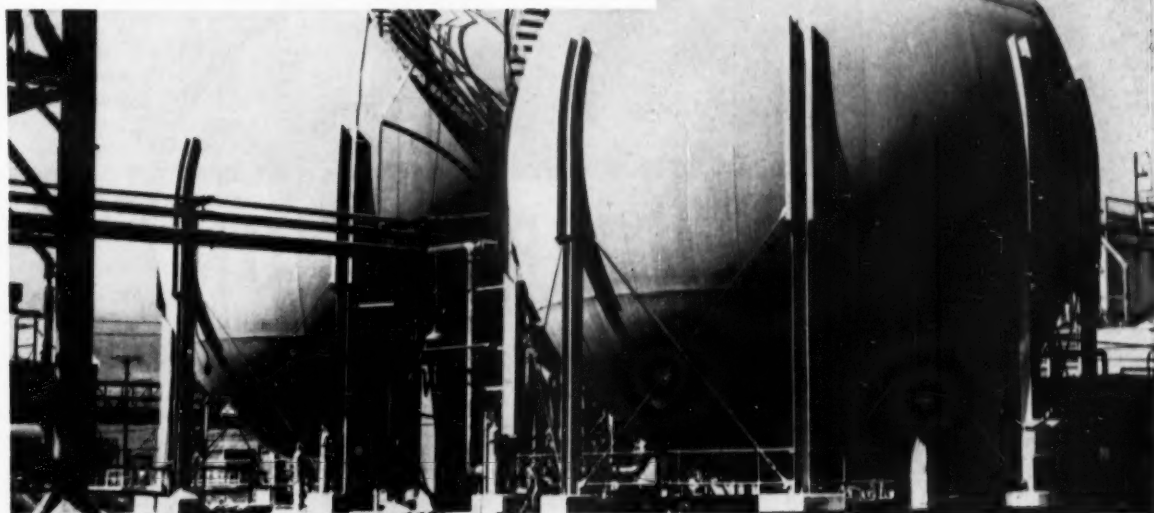
**EMULSOL CHEMICAL CORPORATION**

division of Witco Chemical Company

Dept. CF-2 • 59 East Madison Street, Chicago 3, Ill.



Now expect even better  
service with **UAL**



At Du Pont's Belle Works, Belle, W. Va., spheres like these are used for storage of UAL solutions. A

continuing modernization and expansion program at Belle will further increase production and quality.

## Du Pont continues modernization and expands facilities for **URAMON<sup>®</sup>** AMMONIA LIQUORS

Now Du Pont offers you even more dependable service with "Uramon" Ammonia Liquors. The extensive modernization program at Belle Works includes both expanded production facilities and a stepped-up research program.

Du Pont has been manufacturing urea-ammonia solutions for use in fertilizers since 1931. From this matchless background of broad experience come UAL products of outstanding dependability. For technical help and information on the "Uramon" Ammonia Liquors best suited to your mixing operations, write Du Pont.

### HERE ARE OTHER IMPORTANT ADVANTAGES OF DU PONT URAMON<sup>®</sup> AMMONIA LIQUORS:

- High-quality nitrogen from UAL resists leaching . . . supplies both urea and ammonium forms of nitrogen.
- Safe in granulation . . . no danger of flash fires and less stack. Gives firm, uniform, stable granules, best for storage and application.
- Suitable for either batch or continuous mixing.
- Gives mixed goods better "feel"—minimizes caking, segregation and dusting.
- Won't corrode regular fertilizer manufacturing equipment, including ordinary steel and aluminum.



**URAMON<sup>®</sup>**  
AMMONIA LIQUORS

BETTER THINGS FOR BETTER LIVING . . . THROUGH CHEMISTRY

E. I. DU PONT DE NEMOURS & CO. (INC.)  
Polychemicals Department • Wilmington 98, Delaware  
1616 Walnut St. 7250 N. Cicero Ave.  
Philadelphia 3, Pa. Chicago 30, Ill.

Du Pont Company of Canada (1956) Limited  
85 Eglinton Avenue East, Toronto 12, Ontario



# TENNESSEE CORPORATION

## **PRIMARY PRODUCERS OF FERTILIZER CHEMICALS**

*Including:*

- ▶ **MANGANESE SULFATE**
- ▶ **MANGANOUS OXIDE**
- ▶ **COPPER SULFATE**
- ▶ **ZINC SULFATE**
- ▶ **IRON SULFATE**
- ▶ **MINERAL MIXTURES**



- YOU** are assured a consistent basic source of quality materials.
- YOU** cut costs with combined carloads from one basic source.
- YOU** can save money, time, plant space and effort through the use of our custom formula mineral mixture service.
- WE** back up our products with service, research and technical assistance.

*Over 30 years experience in  
nutritional trace element  
manufacture, research and application  
to mixed fertilizers*

For further information please make requests on your company's letterhead.



## CLOSE-UPS

### NEWS OF SECTIONAL AND LOCAL ACTIVITY

The fast-growing Canadian Agricultural Chemicals Association has named as 1957 president **Gordon Willan**, general manager of **Niagara Brand Spray** headquarters at Burlington, Ont.

\* \* \*

**Utah State Agricultural College**, the **Utah Bankers Association**, and the **National Plant Food Institute**, jointly are sponsoring a program to promote increased use of soil tests by Utah farmers as a "tool" for increasing efficiency in agriculture.

The Institute is bearing part of the cost of the soil testing program, which includes supplying two soil sampling tubes, free, to any interested bankers in Utah. Bankers, in turn, lend the tubes to their farmer-borrowers.

Another phase of the joint program, includes the distribution of instructional leaflets and soil cartons by the college to the banks, free of charge.

Any Utah bank desiring soil sampling tubes, soil cartons, soil sample instructions, etc., may obtain them by writing direct to **J. P. Thorne**, Utah State Agricultural College, Logan, Utah.

\* \* \*

The **Soil Improvement Committee** of the **California Fertilizer Association** is sponsoring a series of workshops for fertilizer salesmen and dealers in early 1957. Two workshops will be held in each of these agricultural area cities: Riverside, Fresno, Salinas, and Sacramento. The Western Fertilizer handbook will be the basis for all discussion. All fertilizer people are welcome, and should plan to attend both sessions at the most convenient locations.

The Riverside programs will be held at Mission Inn on January 9 and on February 21, each at 10 A.M., attracting all interested persons in Southern California. Each of the remaining three workshop programs will be on February 8 and February 21, all at 10 A.M. They will be held at the following locations: Fresno, The Fresno Hacienda, both programs; Salinas, Berdell's Cafe, R-mie Lane and South Main Street, both programs; and in Sacramento, both workshops will be held in Committee Room 5, Civic Memorial Auditorium, 5th and Jay Streets.



## MURIATE OF POTASH for the PLANT FOOD INDUSTRY

THIS symbol stands for high-grade coarse and uniform Muriate of Potash (60%  $K_2O$  minimum). Southwest Potash Corporation provides a dependable supply of HIGH-K\* Muriate for the plant food industry.

\* Trade Mark

## Southwest Potash Corporation

61 BROADWAY • NEW YORK 6, N. Y.

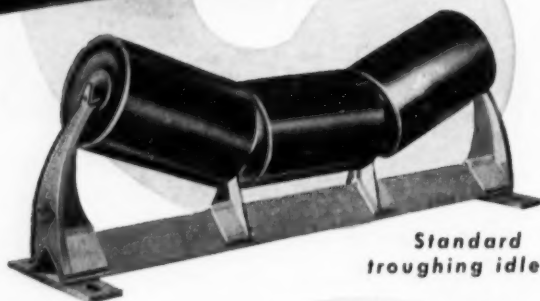
# What do you need in IDLERS?



Unit stand with return  
idler and tripper rail?



Self-aligning  
troughing idler?



Standard  
troughing idler?

Now shipping from stock in  
Birmingham — all conveyor  
accessories and standard  
units. Consult us on "specials"  
— see our nearest office.

CG-5702

*Continental  
has them!*

**INDUSTRIAL DIVISION  
CONTINENTAL GIN COMPANY**

BIRMINGHAM, ALABAMA



ATLANTA  
MEMPHIS

CLEVELAND  
MOBILE

DALLAS

KNOXVILLE  
NEW YORK 17

Again, all fertilizer salesmen and dealers are urged to attend the series of two workshops which will be most convenient to them.

The seventh annual state-wide Fertilizer Dealers Training Conference will be held at the **University of Nebraska** College of Agriculture Jan. 15 and 16.

Main purpose of the conference is to acquaint the dealers and others with latest results of fertilizer experiments on Nebraska's leading crops, according to **M. D. Weldon**, extension soils specialist at the University.

While the conference is primarily for fertilizer dealers and manufacturers, it will be open to the public.

Oklahoma will again play host to the 6th annual national land, pasture and range judging contest next May 2 and 3, at the Oklahoma City fairgrounds. Entries are open to FFA, 4-H, women and girls, collegiate and adults.

Awards will total more than \$2,500, with separate divisions for the 4-H and FFA members. First place teams in each of these divisions will receive approximately \$200, with cash prizes running through several places.

In addition to the cash awards, there will be a generous supply of trophies and medals for contestants from the northeast, southern, north central and the western sections of the country.

Opening day, May 2, will be devoted to a training school to familiarize everyone with the judging score cards, the local soils in the vicinity of Oklahoma City, and local pasture plants. The land judging contest will be held during the morning of May 3, and a separate contest that afternoon will feature pasture and range judging.

Tentative plans are being arranged for a leader's meeting, or representatives of each of the states, on the night of May 2. The awards dinner will be held at approximately 6:30 p.m. the night of May 3. Entries are open to every state in the union and the territories Puerto Rico, Hawaii, etc. Canadians are also invited. For further information, write Jack Stratton, Farm Radio Director, WKY-TV, Oklahoma City, or Edd Roberts, Extension Soil Conservationist, Extension Service, Oklahoma A. and M. College, Stillwater, Oklahoma. You may obtain a brochure, bulletins, and sample judging cards on land judging and pasture and range judging.





## Are you getting your share of the profitable NITROFORM<sup>®</sup> MARKET?

There is a tremendous profitable market today for mixed fertilizers containing "all-blue" 38%-N NITROFORM . . . and with good reason. For wherever good turf is desired, good feeding with a minimum of cost and labor is important.

Look at the advantages of adding NITROFORM to your mixed fertilizer products.

- Saves repeated feedings because one application supplies vital, slowly released nitrogen all season. This cuts maintenance, storage, shipping and handling costs.
- Nitroform mixes easily, is clean, non-leaching, non-burning, non-toxic.

### *Nitroform is a REAL MONEYMAKER!*

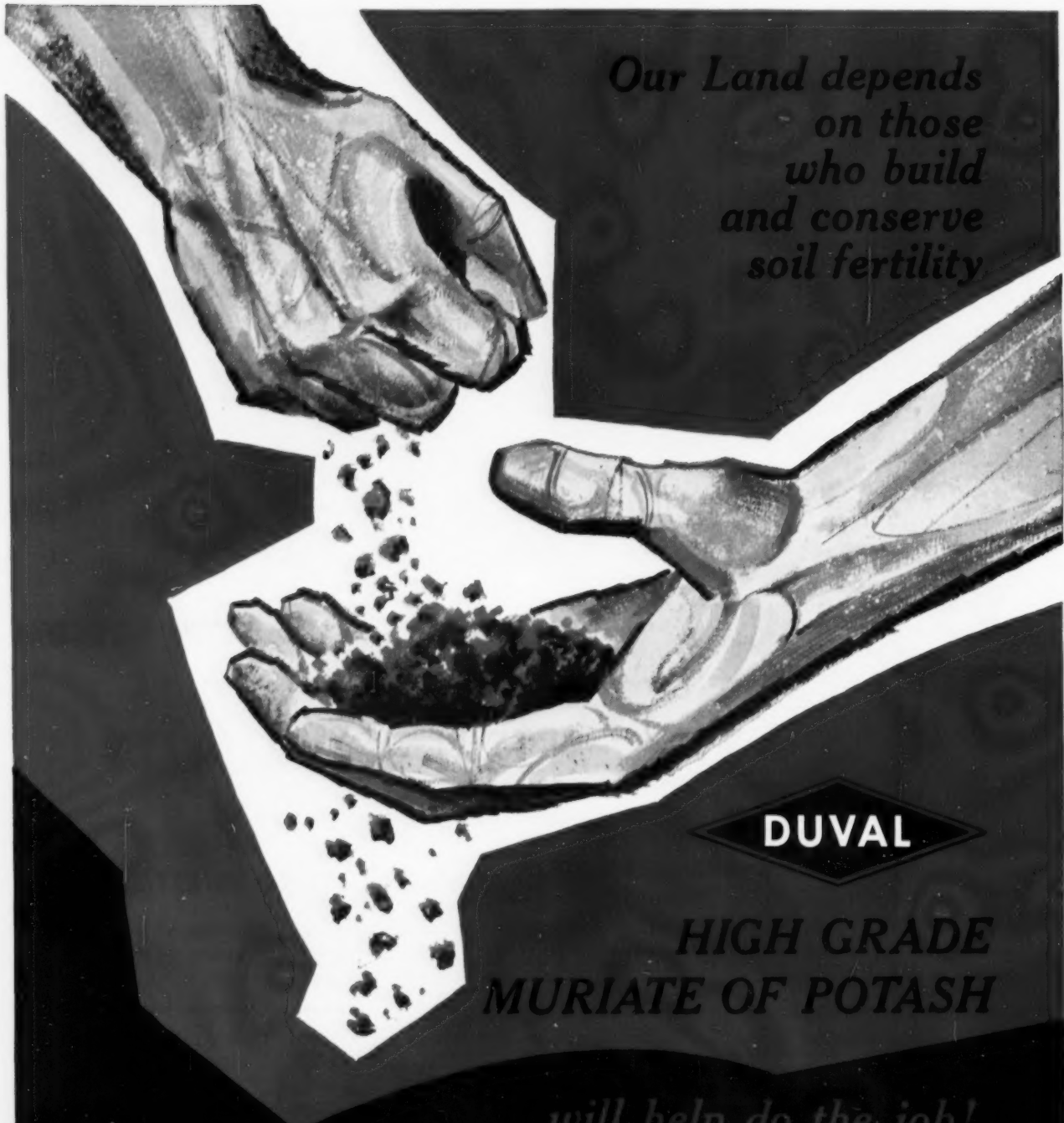
You'll find that by adding Nitroform to your mixed fertilizer products profits will be greater and that satisfaction and results will mean repeat sales.

Write us. We would like to tell you more about this amazing new source of nitrogen — 38%-N NITROFORM.



**NITROFORM**  
**AGRICULTURAL CHEMICALS, INC.**

A DIVISION OF  
Woonsocket Color & Chemical Co.  
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*Our Land depends  
on those  
who build  
and conserve  
soil fertility*

**DUVAL**

**HIGH GRADE  
MURIATE OF POTASH**

*will help do the job!*

*High Analysis · Unsurpassed Service*

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# Arcadian® News

Volume 2

For Manufacturers of Mixed Fertilizers

Number 2

## GETTING MORE NITROGEN INTO SUPERPHOSPHATE

### New Ammoniation Methods Increase Nitrogen Take-Up!

**Ammoniating superphosphate** is the low-cost way of getting nitrogen into mixed fertilizers. For a long time the rate was 3 pounds of ammonia per unit of  $P_2O_5$ . However, through the use of modern methods and materials this rate has been greatly increased.

One unit of  $P_2O_5$  in 20% superphosphate has been made to readily accommodate 5½ to 6½ pounds of free ammonia, without the aid of acid or the loss of nitrogen. Much good fertilizer is being made with ARCADIAN® Nitrogen Solutions supplying 1 unit of nitrogen for each 2 units of  $P_2O_5$ .

A new method of excessive ammoniation has also been developed which has been called "calculated loss." By this method, 1 unit of  $P_2O_5$  retains 8 pounds of nitrogen by the application of 9 pounds in ammoniation. This means that 1 pound is lost but the 8 pounds that are retained are still very low in cost. Through the use of acid, much higher rates are obtained. Some fertilizer manufacturers are getting all the nitrogen into 10-10-10 fertilizer by this method.

High take-up of free ammonia by superphosphate is usually desirable in the manufacture of any mixed fertilizers. It is particularly desirable in the production of granular fertilizers. A high rate of ammoniation not only adds large quantities of low-cost nitrogen, it also generates heat at an opportune time in granulation.



Efficient ammoniation involves proper technique, equipment and materials. There is a complete line of ARCADIAN Nitrogen Solutions from which selections can be made adapted to particular conditions. Nitrogen Division Technical

Men are experts in ammoniation. Their advice is free to customers.

Contact Nitrogen Division, Allied Chemical & Dye Corporation, 40 Rector Street, New York 6, New York.



## **Fertilizer for Grasslands Big Opportunity for Sales**

**How much more** fertilizer could your dealers sell if every farm customer used 500 pounds per acre on his pastures and hay fields? Even in the less concentrated livestock areas, the extra sales would mount into a tidy profit. And some farmers *do* use this much fertilizer on grazing land—despite the fact that pastures are probably the most neglected soils, fertilizer-wise, of all farmland.

Take the case of one dairy farmer who uses 500 pounds of fertilizer per acre on hay, pastures and silage crops. The high quality and high yield of his roughage saves him \$80 to \$100 per cow per year on feed. And he saves labor too, because the cows harvest the crop.

### **More Grass—More Protein**

In Wisconsin, a series of tests with 500 pounds of 13-13-13 or 12-12-12 per acre of pasture produces \$45 to \$60 worth of extra feed per acre. Average dry weight yield of pasture with fertilizer was over 2 tons per acre (more than 13,300 pounds green weight). Without fertilizer, pasture dry weight yield was only 1,300 pounds (4,300 pounds green weight). Protein content of the fertilized pasture ran over

18%—the equivalent of a good dairy ration.

In Texas, total cost of fertilizer applications on a 6-acre pasture for 5 years was \$448. Compared to a 15-acre unfertilized pasture, this 6-acre plot with plant food produced 7% more milk, worth \$613. Extra hay was worth \$135. And the milk produced on the improved pasture tested 0.2% to 0.3% higher in butterfat. Over all, the \$448 for improving a 6-acre pasture returned \$1,044 above the income on the 15-acre unfertilized lot.

### **Benefits Native Grass**

U.S.D.A. rangeland tests in Montana show similar improvement in range grazing. Range, fertilized with 90 pounds of nitrogen per acre, averaged 2,270 pounds of dry grass weight per acre each year, for six years. Without fertilizer, range produced only 748 pounds dry weight grass per acre. The percentage of protein in the grass also shot up, to provide extra feed benefits.

There is a big market for fertilizer right under the nose of the grazing cow. The more plant food we use on pastures, the better the livestock profits, and the better the fertilizer business.

**Again we tell  
3½  
Million  
Farmers  
Fertilizer  
Grows  
Farm Profits**

**Farming today** requires a bigger investment per worker than most major industries. It takes money to make money farming.

**Fertilizer** is one of the lowest cost items the farmer buys, closer to pre-war prices than anything else needed to grow crops. Fertilizer helps a farmer to get greater returns from his other investments in land, labor, machinery and other production costs.

**The vital importance** of fertilizer to the farmer is being brought to the attention of millions of readers of farm magazines in a powerful and continuing campaign conducted by Nitrogen Division, Allied Chemical & Dye Corporation.

**Shown on the opposite page** is one in a series of big, full-page advertisements appearing in farm magazines. Others have preceded it and more will follow. We trust that this campaign meets with your approval and we will greatly appreciate any comments or suggestions you may wish to send us.





Soil tests are an excellent guide in choosing the right fertilizer analysis.

## Your fertilizer dealer wants to help you make more money...

The man helping the farmer test his soil in the photo above could be a County Agent or a Vo-Ag teacher. Actually he is a fertilizer dealer selling fertilizer with real service. He wants to supply his customer with the most profitable fertilizer for him to use—the fertilizer that will help every acre pay him more.

It's an important undertaking to provide you with the best value in fertilizers—the greatest crop-producing power for your money. That's why your dealer makes a careful study of crops and soils in your neighborhood. He knows the analyses and amounts of fertilizers used with success by other farmers. He studies Experiment Station results and Extension Service recommendations. He works with the County Agent and Vo-Ag teacher in crop and fertilizer demonstrations.

As costs mount for land, taxes, labor and machinery, your fertilizer dealer is eager to be of greater help to you. For fertilizer is more important to you now than ever before. It costs you less than anything else you have to buy to grow a crop. And average results show that it pays back several dollars for each one invested.

Talk it over with your fertilizer dealer. He wants to help you make more money this year. He wants your confidence and good will for many years to come.

*The fertilizer industry serves the farmer. Nitrogen Division serves the fertilizer industry as America's leading supplier of nitrogen, the growth element in mixed fertilizers. Nitrogen Division, Allied Chemical & Dye Corporation, New York 6, N. Y.*



This fertilizer dealer sees how well the plow-down fertilizer he recommended has rotted down crop residues to feed the new crop.

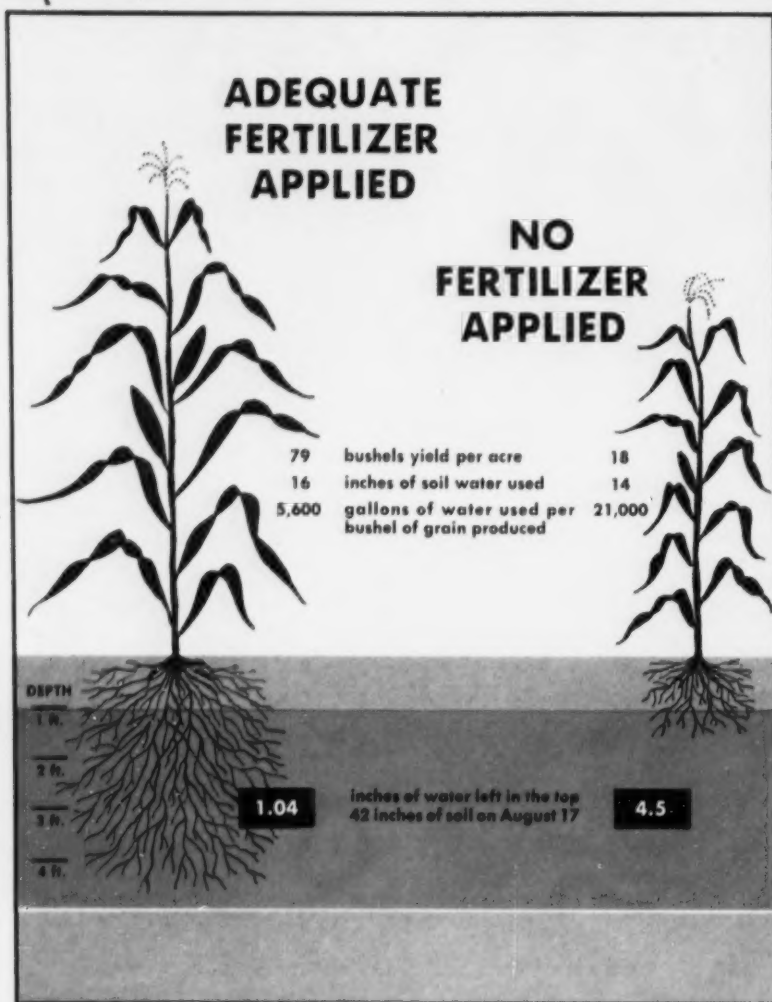


This fertilizer dealer helps a farm family estimate yield on a well-fertilized field. The smiles indicate a money-making crop.



This fertilizer fieldman checks grain plots to note good grain growth without lodging. His findings will benefit many farmers.

## FERTILIZER GROWS FARM PROFITS



## Less Water Is Required Per Bushel of Corn When Crop is Well-Fertilized

Farmers and fertilizer dealers alike are too often pessimistic about the use of fertilizer in a dry season, or following a dry season. Agronomists point out that when subsoil moisture is good, adequate fertilizer enables the crop to grow vigorously and send its roots deep for water. This is shown in the diagram above, based on Missouri tests in a year with only five inches of rain during the growing season. Unfertilized corn left much soil moisture unused.

When subsoil moisture is low, a thinner stand of corn with plenty of fertilizer will produce bigger ears and more bushels than either a thin, unfertilized stand or a thick stand that would run out of water before earing out.

Corn following a drouth year will get considerable benefit from the previous year's plant food. But at best it gets 40% to 60% of the fertilizer held over in the soil. Later crops will get the rest. A good crop still requires plant food applied in the season of growth.

In the dry summer of 1955, 48 Wisconsin farms with well-fertilized corn produced 85 bushels per acre. The state average yield was only 50 bushels per acre.

### Wheat Yields Better

Other crops, too, yield better on a limited water supply when well fertilized. North Dakota tests showed fertilized wheat matured earlier and produced 5 bushels more per acre on the same amount of water as unfertilized wheat.

## A COMPLETE LINE OF Nitrogen Products

Here is the most complete line of nitrogen products available to the fertilizer industry, made by America's leading producer of nitrogen and backed by many years of experience, dependable service and expert technical assistance:



### NITROGEN SOLUTIONS:

URANA®  
NITRANA®  
U-A-S\*  
N-dure\*

### Other Nitrogen Products:

Anhydrous Ammonia  
Urea Products  
A-N-L®  
Ammonium Nitrate  
Sulphate of Ammonia  
American Nitrate of Soda



### NITROGEN DIVISION

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Los Angeles 5, Cal.

San Francisco 4, Cal.

\*Trade-mark



## "Best time-saver I know of

is the burlap bag," says A. R. Baggett, prosperous truck-farmer of Suffolk, Virginia. "There's no wasted, spilled fertilizer with strong-seamed burlap bags that stand up to rough handling. They stow better and take less men for loading and unloading. I've been a burlap man for 35 years—was, have been, and always will be."

*Time-saver, money-saver*—no wonder burlap is the farmer's favorite bag. Suppliers who are trying to serve the farmers' best interests pack fertilizer in burlap bags. Fertilizer keeps better in ventilated burlap bags and handles easier in the tough, heavy-duty burlap. You can save your own time and money by packing in the good old standby—burlap.

**Just ask your own customers—  
they'll tell you that burlap**



**Is strong** — takes dragging, dropping, man-handling — any tough job on the farm.



**Gives good ventilation** — keeps farm supplies and products fresh.



**Laughs at sudden showers** — wetness or dampness can't weaken it.



**Saves money** — extra value from re-sale and re-use.



**Saves storage space** — stacks to any height without slipping.



**Has 1000 uses** — always in demand on the farm (popular with farm wives, too!)

**THE BURLAP COUNCIL**

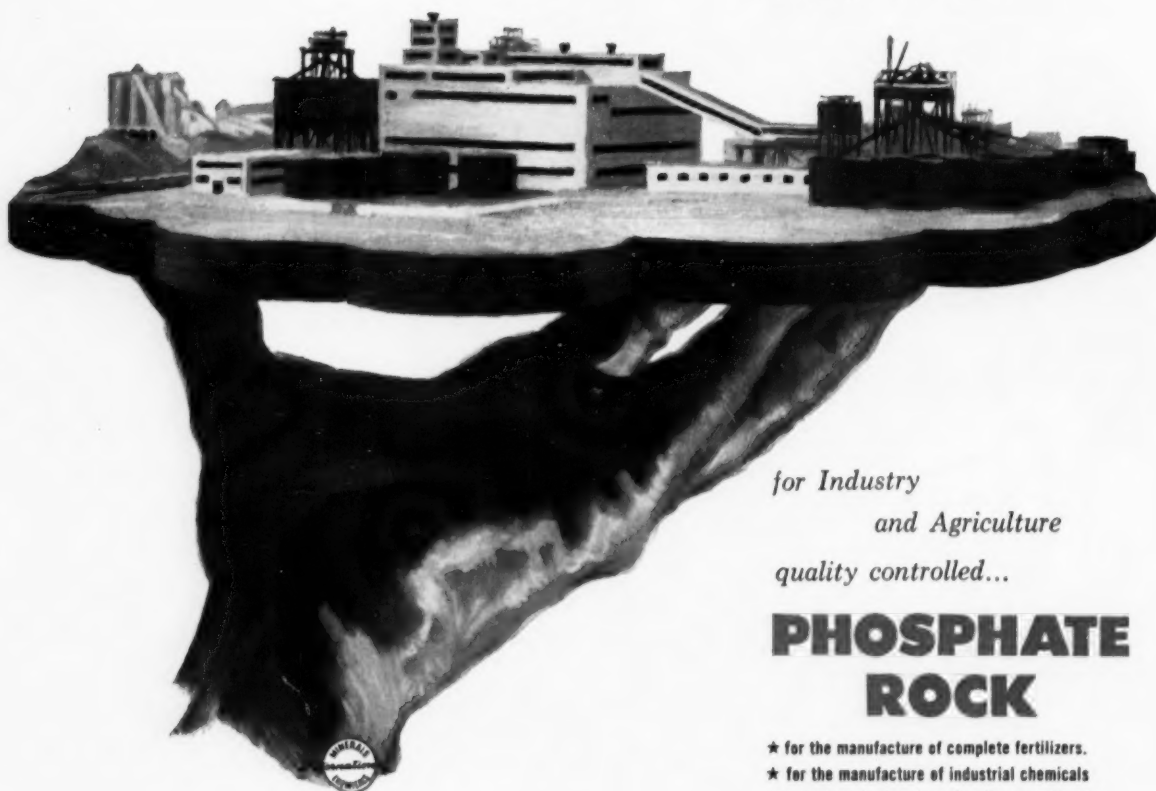
of the Indian Jute Mills Association  
155 East 44th Street, New York 17, N. Y.



When dealers and farmers are screaming for fertilizers and dry mixing plants are pushing for superphosphates, you can be sure that *International* will meet your toughest schedules for deliveries of quality-controlled phosphate. For here at *International* we have the resources and facilities to meet your demands. Six big mines and plants. Huge storage capacity. A full range of grades of quality-controlled phosphates. And the ability to handle routine or emergency orders on time.

## WHEN THE PRESSURE IS ON

here are resources  
to help you



*for Industry  
and Agriculture  
quality controlled...*

## PHOSPHATE ROCK

- ★ for the manufacture of complete fertilizers.
- ★ for the manufacture of industrial chemicals
- ★ ground rock phosphate for direct application to the soil.

PHOSPHATE MINERALS DIVISION  
**INTERNATIONAL MINERALS  
& CHEMICAL CORPORATION**

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Peace Valley, Achan, Mulberry; in Tennessee at  
Mt. Pleasant and Wales.



# Should Farmers Change

My function on this program is to briefly acquaint you with a study of fertilizer marketing which we currently have underway in the Department of Agricultural Economics. As many of you may know, we have a rather extensive program of research dealing with the marketing of the several crops and livestock products produced in Indiana.

Until very recently, however, we have paid relatively little attention to the marketing of farm supplies. This study of fertilizer marketing represents part of what we hope will be an expanding program of research in the marketing of farm supplies. It is our objective in this research to be of assistance to both farmers and to members of the Indiana farm supply industries.

As a first stage of our fertilizer and marketing research, we have been attempting to obtain a better understanding of (a) how fertilizer is marketed and priced in Indiana, (b) the effectiveness of the different marketing methods and (c) the impact which new technology in fertilizer manufacture can be expected to have on trends in fertilizer marketing.

Thus far, we have conducted market surveys at two levels. We first interviewed farmers in three Indiana counties (Jasper, Boone, & Ripley) concerning their fertilizer buying practices. Secondly, we interviewed dealers in the same three counties regarding their fertilizer marketing and pricing practices. In both cases, we also asked a number of questions relating to the knowledge of the marketing system possessed by both farmers and dealers.

As part of our farmer survey we asked two questions regarding farmer's response to price changes. First, we asked the question, "If next year fertilizer prices stayed about the same as this year and the prices of things you sell go down about 5%, will you use (1) more fertilizer than this year, (2) less fertilizer than this, or (3) about the same amount of fertilizer as this year." We also asked, "If next year, the price of things you sell stay about the same as this year, and fertilizer prices go up about 10%, will you use (1) more fertilizer than this year, (2) less fer-

## APPLICATION LEVELS AS PRICES CHANGE?

VERNON W. RUTTAN & CALVIN R. BERRY  
Department of Agricultural Economics  
Purdue University

tilizer than this year; (3) about the same amount of fertilizer as this year?"

In our dealer survey, we asked dealers how they would expect farmers to react to the same economic changes which we posited in

our questions to farmers.

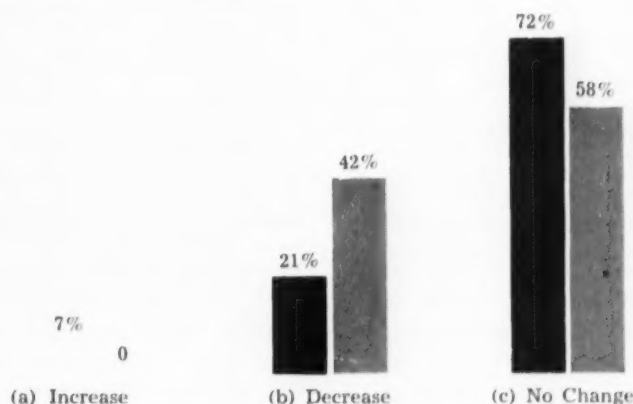
The answers which farmers and dealers gave us to these two questions are presented graphically in Figure 1. The answers were much the same in all three counties. It is quite clear from Figure 1 that most

**Figure 1. Farmer & Dealer Sensitivity to Fertilizer and Other Price Changes.**

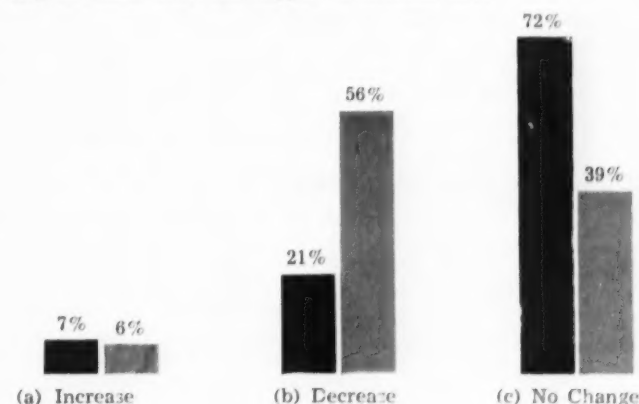
/1. If fertilizer prices stay the same and prices of things farmers sell drop by 5% what will happen to fertilizer use?

Farmer response

Dealer response

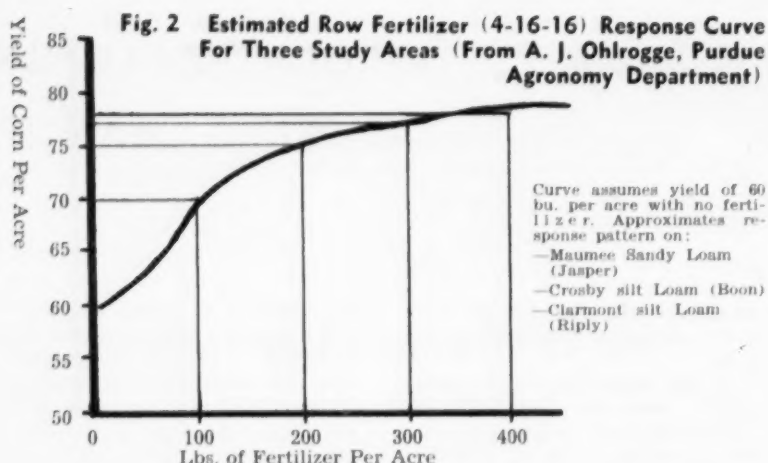


/2. If fertilizer prices go up by about 10% and prices of things farmers sell stay the same what will happen to fertilizer use?



Presented at Purdue Fertilizer Conference, Nov. 27, 1956.

Source: Purdue Fertilizer Marketing & Pricing Study, preliminary tabulation.



farmers believe that they should not change their level of fertilizer applications in response to price changes of the magnitude which we suggested in our question. Dealers on the other hand expect farmers to be much more sensitive to price changes than farmers believe they should be.

There can be little doubt that in the past, at least, dealers have had ample justification for their expectation that farmer's expenditures for fertilizer is closely related to changes in farmer's income. Prior to 1947 changes in farm income and in fertilizer use were very closely correlated in both Indiana and in the United States as a whole. By introducing fertilizer prices and lagging farm income by one year, the relationship between farm income and expenditures for fertilizer could

be made even more precise during the period prior to 1947. There can be little doubt however, that between 1947 and 1954, the old pattern of relationship between farm income and fertilizer use however calculated, no longer exists. As farm income has leveled off fertilizer use has continued to expand. The leveling off of fertilizer consumption in the last year or so, however, may indicate emergence of a new relationship between fertilizer use and farm income. It is too early, however, to do more than speculate on this matter.

There is evidence, however, indicating that most farmers have been right in believing that they should not cut back on their fertilizer application levels in response to the price changes of the last few years. In Figure 2, we have presented an estimated, response curve for 4-16-

16 fertilizer applied in the row on land which would yield about 60 bushels per acre of corn in the absence of fertilizer.

This response curve holds fairly well for all three of the counties in which we interviewed farmers and dealers.

Note how the yield response levels off at just below 80 bushels per acre as we move beyond the 300 pound per acre level of application. Using Figure 3 as a basis for our calculations, we have developed some estimates of the additions to net return, resulting from each additional level of fertilizer application. These estimates are presented in Table 1.

Taking corn at \$1.20 a bushel, and 4-16-16 fertilizer at \$3.00 per hundred, or \$60.00 a ton, a fairly common cash price for 4-16-16, it is clear that the best level of application is between 200 and 300 lbs. per acre—almost exactly at 250 pounds per acre. At 200 lbs. per acre, we obtain an addition to net income of \$3.00. As we reach 300 lbs. per acre, the addition to net returns is \$.60 less than the \$3.00 which we spent for the last 100 lbs. of fertilizer.

In our second calculation, we left corn at \$1.20 a bushel and raised the price of fertilizer to \$3.35 per hundred or \$67.00 per ton. This raises the price of 4-16-16 to about the level that is charged when 4-16-16 is purchased on credit. No change in the level of fertilizer application is indicated as a result of this change in fertilizer price.

**Table 1. Estimated Returns from Fertilizer Application For Three Study Areas**

Pounds of 4-16-16 Used/Acre	Yield of Corn/Acre (Bushels)	Addition to Price Yield from 4-16-16 Fertilizer Additional per 100 lbs.	Total Fertilizer Cost/Acre	Total Cost/Acre (less labor cost)	Corn Price Per Bushel	Market Value of Corn per Acre	Net Return to Labor and Management per Acre	Addition to Net Return From Additional Fertilizer
<b>(1). 1.20 Corn 3.00/100 fertilizer (60.00/ton)</b>								
-0-	60	-0-	3.00	-0-	42.00	1.20	72.00	30.00
100	70	10	3.00	3.00	45.00	1.20	84.00	39.00
200	75	5	3.00	6.00	48.00	1.20	90.00	42.00
300	77	2	3.00	9.00	51.00	1.20	92.40	41.40
400	78	1	3.00	12.00	54.00	1.20	93.60	39.60
<b>(2). 1.20 Corn, 3.35/100 fertilizer (67.00/ton)</b>								
-0-	60	-0-	3.35	-0-	42.00	1.20	72.00	30.00
100	70	10	3.35	3.35	45.35	1.20	84.00	38.65
200	75	5	3.35	6.70	58.70	1.20	90.00	41.30
300	77	2	3.35	10.05	52.05	1.20	92.40	40.35
400	78	1	3.35	13.40	55.40	1.20	93.60	38.20
<b>(3.) 1.10 Corn, 3.00/100 fertilizer (60.00/ton)</b>								
-0-	60	-0-	3.00	-0-	42.00	1.10	66.00	24.00
100	70	10	3.00	3.00	45.00	1.10	77.00	32.00
200	75	5	3.00	6.00	48.00	1.10	82.50	34.50
300	77	2	3.00	9.00	51.00	1.10	84.70	33.70
400	78	1	3.00	12.00	54.00	1.10	85.80	31.80

In our third calculation, we left the price of fertilizer at \$3.00 per hundred, or \$60.00 per ton, and dropped the price of corn to \$1.10 a bushel. Again, approximately the same level of fertilizer application is indicated as in our first calculation.

Thus, our calculations tend to support the views of those farmers who believe that they **should** not change their fertilizer application levels in response to price changes of the magnitude posited in our questions. Only those farmers in our study area who are already using applications of over 300 lbs. of fertilizer should consider changing their application levels in response to price changes in the 5-10 percent range.

We do not mean to imply, of course, that fertilizer application levels should be entirely irresponsible to changes in the prices of fertilizer or of farm products. If in our study area the price of corn fell to about 90 cents per bushel it would pay to cut the level of fertilizer application from 250 to 200 lbs. per acre; if it rose to \$1.50 per bushel it would pay to increase the level of application to 300 lbs. per acre. If the price of 4-16-16 fell to \$40.00 per ton it would pay to increase the level of application to 300 lbs. per acre; if it rose to \$80.00 per ton it would pay to cut the level of application from 250 to about 200 lbs. per acre.

The relatively small changes in application levels indicated by the rather extreme price changes in the above example merely serve to emphasize the correctness of our conclusion—**farmers are generally correct in their belief that they should not alter their fertilizer application levels in response to normal price changes.** This conclusion is also generally correct for land capable of yielding more than 60 bushels per acre and for somewhat different fertilizer programs such as use of a fertilizer containing more nitrogen than 4-16-16 or application of 4-16-16 plus a nitrogen side dressing. Such changes would shift the response wave of Figure 2 upward and might also result in some changes in its slope. Farmers should become price sensitive in their fertilizer application levels only on soils in which the response curve displays a much sharper curvature than the curve presented in Figure 2.

Our conclusion is not, however, necessarily inconsistent with the **expectation** of fertilizer dealers that

farmers will reduce their application rate following a decline in farm income. When subjected to heavy financial pressure or faced with sub-

stantial price risks farmers may react in a manner that is not consistent with their beliefs about how they **should** act.

## COSTS, MARKETS AND PROSPECTS *in the Fertilizer Industry*

by DR. PHILIP NEFF, Director  
Industrial and Governmental Economics Research  
Planning Research Corp., Los Angeles, Calif.

It is wholly unnecessary to discuss in a meeting of this kind the importance of the fertilizer industry in the American economy or in the economy of the Western states. All of you know far more about this than I do. It is, however, my job here to analyze certain economic characteristics of your industry, to show you why these characteristics are important, to provide you with a technique which will enable you, if you are interested, to enjoy larger profits henceforth, than you have in the past, and to share in a more reasonable way in the future prosperity of our economy. I hope to be able to demonstrate to you a method for forecasting fertilizer consumption which will make possible forecasts of your own output and a rational planning of your own operations.

A knowledge of the future is, of course, important to any businessman, but it is especially important to businessmen in the fertilizer industry, for the following reasons:

1. Capital requirements in this industry are usually high and it is not possible for a firm rapidly to adjust its plant size to market conditions. Capital costs are high for several reasons. First, the industry is highly seasonal—about 75 percent of fertilizer produced is consumed between January and June, and only about 25 percent during the rest of the year and the difficulties associated with storage mean that fertilizer producers must, on the average, have considerable excess capacity. One estimate indicates that plants must be a minimum of 100 percent larger than a plant designed to produce its average monthly output at the lowest possible cost.

Second, fertilizer plants have a tremendous materials handling job. To produce a ton of mixed fertilizer,

a plant must handle from eight to ten tons of materials. It must, therefore, be a relatively large plant in floor space, must have ample storage space or bin facilities, and very considerable heavy moving equipment. Total capital costs for a plant designed to produce 25,000 tons of fertilizer per year are estimated at from \$850,000 to \$1,000,000, exclusive of land, with working capital representing less than 60 percent of the total.

II. Differential capital equipment and associated differences in technology have a tremendous effect in the operating experience of fertilizer producers. A very detailed study prepared by the Bureau of Labor Statistics provides the following data on this point.

1. Total man hours required per ton in mixing operations varied from a .48 to .92—among a representative group of fertilizer producers—large and medium size.

2. Direct man hours in these plants ranged from .25 to .79 and indirect from .12 to .27.

3. Among plants of almost identical size and product the range for the total was a .48 to .81—direct .25 to .54—and indirect, .12 to .27.

4. To pack and ship the product, similar wide ranges in performance were observed with total man hours ranging from .99 to 1.55, direct from .52 to 1.03—and indirect to .15 to .54.

Not only are capital requirements high, but the form of the capital and its amount very significantly effect operating performance.

III. The fertilizer industry is one in which technology is changing rapidly. Plants cannot, at one time, make the optimal choice with respect to size, equipment and operating procedures and then assume that its operations will henceforth remain optimal or even economical. Since World War II the rapidly changing technology in the industry has decreased man hour require-

*Presented at 33rd annual meeting of California Fertilizer Assn., Coronado, Calif., November 12.*

ments per unit of output by approximately 20 percent and there appears to be no decline in this rate of decrease. Fertilizer producers must constantly adapt themselves to changing markets and changing methods — the former requiring changes in the size of plant, in the product produced and in the production processes—and in the latter, requiring changes of the same sort. Producers who most rapidly adapt themselves to these changing conditions and even anticipate them will be most successful. Those who fail to make such an adaptation will ultimately fail. If I am able to provide you with a method for anticipating one important type of change requiring adaptation which affects capital requirements, plant size and equipment complement, I will have performed a useful function here today.

The market for fertilizer in the future depends on farm income today, farm income in the future, and the difference between today's farm income and farm operating costs other than fertilizer costs today. Some very interesting demonstrations of the force of these determinants are available. It is, however, very difficult if not impossible directly to forecast these determinants for any period beyond a year, and hence they are of little value in the formulation of long term investment policy. Moreover, it seems apparent that the relative importance of these determinants is shifting, and that expected farm income is playing a more important part in determining fertilizer consumption than has heretofore been the case.

These considerations lead me to propose to you a comparatively simple method for forecasting fertilizer consumption which is only indirectly related to these variables. This method involves the correlation of fertilizer consumption with gross national product and the forecast of the former from its relationship to the latter. One virtue of this method is that gross national product is defined in such a manner that statistical data can be collected which are essential to forecasting it. Also, many forecasts of gross national product are made by agencies who devote very substantial resources to this task, and hence there are estimates available against which to check ones own. Exhibit 1 shows the relationship of fertilizer consumption to gross national product from 1930 to 1955 in real terms. (See table.) Even a cursory examination of this exhibit reveals an ex-

tremely close correlation of fertilizer consumption and real national output. There are many reasons justifying this relationship, not the least of which is the fact that part of national output is represented by agricultural output and that farm income varies with gross national product.

Gross national product is defined as the total value of goods and services produced in a given year or the total amount spent on currently produced goods and services in a given year. Real gross national product is the total amount produced or the total amount purchased and is calculated by adjusting for changes in price levels. Since G N P is de-

fined as the total amount spent on goods and services, it can be forecast by forecasting the amounts spent by various spending units—individuals for consumer's goods, individuals and businesses for investment goods, and governmental for the goods and services purchased by Government.

The most useful and simplest method of forecasting is to analyze those things which determine the amount of spending by these units and to estimate the force of these determinants operating at the present time. Assessment of these forces can be revised from time to time as

# **Exhibit 1. RELATIONSHIP OF FERTILIZER CONSUMPTION TO GROSS NATIONAL PRODUCT, 1930-1955 and Projections 1965 and 1975.**

*Prepared by Planning Research Corp., Los Angeles*

## **FERTILIZER CONSUMPTION** (Thousands of Tons)

40,000

35,000

30,000

25,000

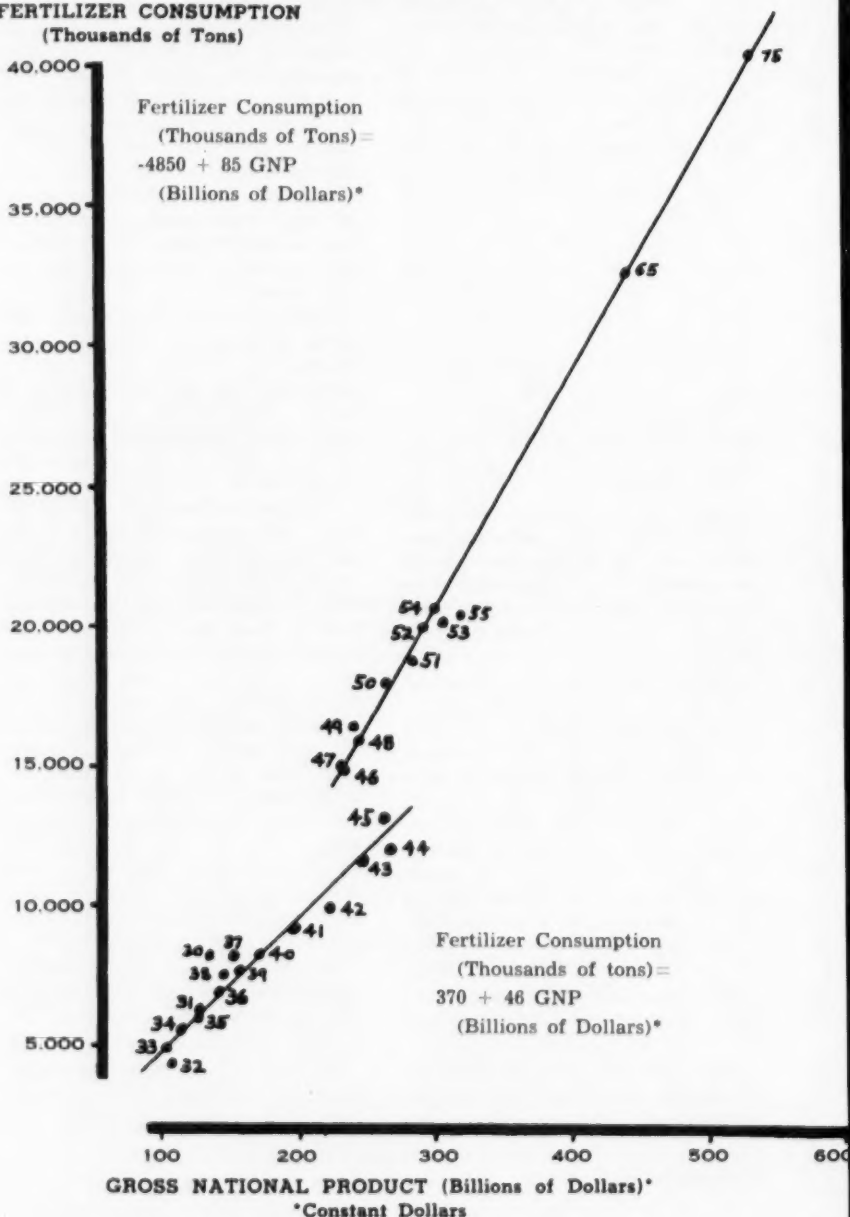
20,000

15,000

10,000

5,000

Fertilizer Consumption  
(Thousands of Tons) =  
 $-4850 + 85 \text{ GNP}$   
(Billions of Dollars)\*



Fertilizer Consumption  
(Thousands of tons) =  
 $370 + 46 \text{ GNP}$   
(Billions of Dollars)\*

**GROSS NATIONAL PRODUCT (Billions of Dollars)\***

\*Constant Dollars





## TIME IS MONEY... SAVE BOTH!

ORDER NITROGEN PRODUCTS FROM SINCLAIR NOW

There are two big reasons why you should sign now with Sinclair for your supplies of nitrogen solutions, anhydrous ammonia and aqua ammonia.

First — the completion and opening of a centrally-situated new plant in Hammond, Indiana, means substantial savings in delivery time and shipping costs for most Mid-West nitrogen users.

Second — your seasonal supply problem can be solved by this plant's vast storage capacity... products will be delivered when you need them to meet your production schedule.

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new facts become available and new estimates of GNP can be made from which forecasts of fertilizer consumption can be calculated. Time limitations preclude anything but a very quick discussion of these forces.

1. Personal consumption expenditures depend on:

- a. Current and past rates of saving
- b. Consumer expectations with respect to prices
- c. Consumer liquidity
- d. Age distribution of consumer durable goods
- e. Consumer expectations with respect to shortages
- f. Current take-home pay
- g. Expectations with respect to stability of employment

2. Gross private domestic investment must be divided into three parts:

- a. Residential construction de-

pends on: (1) Mortgage terms (2) Employment (3) Price expectations (4) Condition of existing housing

b. Commercial and industrial construction and producers' durable equipment spending depends on: (1) Price expectations (2) Volume expectations (3) Profits and cash position.

Intention surveys are very reliable in projecting this item.

c. Business inventories depend on: Price expectations almost wholly.

3. Government Purchases

a. Federal depends primarily on international conditions.

b. State and local depends on citizen demand for State and local services (a very stable item).

Exhibit 1 provides estimates of annual fertilizer consumption in 1965-1975. Gross national product figures are calculated from esti-

mates made by the Joint Committee on the Economic Report and show fertilizer consumption increasing over 1955 levels 60 percent by 1965 and 100 percent by 1975.

For those interested in projections for the shorter term, real gross national product of approximately 330 billion for 1957 is not unreasonable, placing fertilizer consumption next year close to 23½ million tons—up 3 million tons above 1955 levels.

Continuous adjustment of gross national product forecasts will permit fertilizer producers to make the best possible projections of total fertilizer consumption and hence, of their own markets. Longer range projections of gross national product will permit producers to plan investment programs and facilities requirements and thus rationalize their requirements. (Table 1.)

## PICTURES OF LEADING PERSONALITIES

### AT THE RECENT CFA MEETING

1—1957 Board of Directors. Front row—Treasurer Howard H. Hawkins; Vice President Wm. G. Hewitt; Wm. E. Snyder, 1956 President; President Jack Baker; & Secretary M. M. Stockman. Rear row—V. A. Frizzell; Lowell W. Berry; Fred R. Bryant;

John C. Anderson; & John N. Williams. Not present, Earl R. Mog and Arthur W. Mohr.

2—Howard H. Hawkins, Chairman of Nominating Committee, making his report.

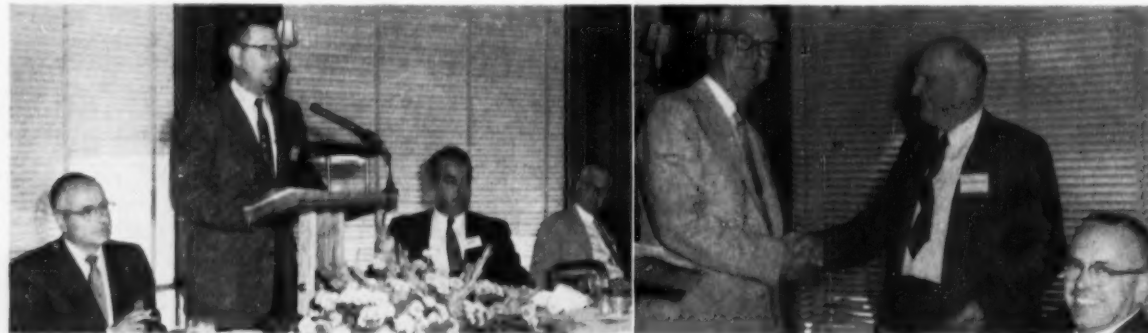
3—Panel (L. to R.)—George Monkhouse, San Francisco; J. Earl Coke, San Francisco; Moderator Dr. J. E. Knott, Davis; and Ned Lewis, Los Angeles. Not in picture, Dr. Philip Neff, L. A.

4—James M. Quinn, Chairman, Bankers' Information Committee, making his report.



Left—At luncheon meeting: L. to R., President Jack Baker; Wm. E. Snyder, President during 1956; Program Speaker Dr. Philip Neff, Los Angeles Economist; and M. E. McCollam, Chairman, Soil Improvement Committee.

Right—Warren R. Schoonover of University of California accepting testimonial from Millard E. McCollam, Soil Improvement Committee Chairman. L. to R.—McCollam, Schoonover and C. F. A. President Jack Baker.





## Around the Map

### ALABAMA

**TVA's** Wilson Dam fertilizer works has announced a 90-minute process for producing superphosphate. By using finer rock and more acid, the process "cures" in an hour. Mixing etc. take up the other 30 minutes. They tell us many fertilizer plants now have most of the equipment needed, and conversion would be "fairly simple."

### CALIFORNIA

**American Potash & Chemical** has opened the \$200,000 addition to its laboratory at Whittier, expanded to house the personnel, doubled since 1953, working on their expanding research program under the direction of **Dr. William Emerson**.

**Redel Inc.** have bought and moved to Anaheim the analytical equipment of **Ontario Agricultural Laboratories**, Ontario, and will henceforth render the services formerly supplied by Ontario.

**Plant Food Corporation's** chiefs recently celebrated the arrival in California of one of the largest shipments of plant food ever to come in by rail . . . a water soluble ammonium phosphate fertilizer, for which PFC's people report an increasing demand from California growers.

**U.S. Borax and Chemical** now expect to be able to move into their new \$1,000,000 laboratory at Anaheim by April. Once established there they can pursue their policy of trebling research activity, spending more than \$1,000,000 a year. The new lab centralizes all their research activity under one roof.

### FLORIDA

**Swift & Co's** Bartow plant is supplying a real miracle to Floridians, — a ski slide. Tailings from their flotation process turn out to be slick enough so that visitors in great numbers can "ski" down a hill covered with them, on water skis. May-be there's a nice by-product market in the stuff!

**Davison Chemical** have begun construction of a new office building at Bartow for the Florida phosphate division. It will accommodate 65 people in its 10,500 square feet of floor space, according to manager **W. R. Fort**.

### ILLINOIS

**Velsicol Chemical** will this season supply cotton growers with methyl parathion produced in its Marshall plant.

### IOWA

**Black Leaf's** Des Moines plant will be expanded to double both production and warehouse capacity, according to mid-West manager **Emil C. Gerdes**. New and improved formulation, reactor, packaging and power-handling equipment will be installed, and the job should be ready for business by the middle of this month.

### KANSAS

**Blue Valley Fertilizer**, Marysville, has added to its equipment a saw-mill, capable of turning out 10,000 daily board feet.

### LOUISIANA

**General Petroleum's** \$12,500,000 plant at Lake Charles is getting close to production time. Owned, as our readers know, jointly by **Cities Service** and **Continental Oil**, it should turn out 100,000 annual tons of anhydrous ammonia.

**Shreveport Fertilizer Works** has dissolved its charter of incorporations.

### MINNESOTA

**Great Northern Oil** by the time you read this should be in production with their new catalytic desulphurization unit in St. Paul's Pine Bend area where is located their \$25,000,000 refinery—the fourth such unit there—which is being built by **Fluor Corp.**, who are also general contractors for the refinery.

**St. Paul Ammonia Products'** \$16,000,000 plant in the same area should be complete about May 1, in time for the June-July demand for liquid nitrogen, according to **Dan A. Williams**, company president.

### RED FACE DEPT.

In November "Map" we had an item about Anaconda buying anhydrous for production of "Ammono-Phos." This was transcribed from the original source which called it "ammo-phos" without the caps, and the error was not caught until the November issue was in the mails. "Ammono-Phos" has been registered in the U. S. Patent Office since 1914, is the property of **Olin Mathieson**, and obviously cannot and should not ever be used as the generic term for ammonium phosphate fertilizers.

Our apologies to **Olin Mathieson**. All we can say is, we knew better but we slipped up.

### MICHIGAN

**Socony Mobil Oil's** \$3,500,000 sulphuric-acid-alkylation unit at Trenton has been awarded to **Fluor Corporation** who will design, engineer and build the 3500 daily barrel plant, with completion scheduled for early next year.

### MISSISSIPPI

**Meridian Fertilizer** is among the sponsors of the first cotton production contest ever to be held in Forrest County.

**Delta Liquid Plant Food Co.** has been chartered at Greenville with \$50,000 capital stock.

### MISSOURI

**Swift & Co.** went into operation with their new mixing plant at St. Joseph last month. It is a steel structure, 394 by 146 feet, with a 32 by 48 foot office.

**Sur-Gro Plant Foods**, Plattsburg, are completing their \$50,000 plant at Mexico, and expect to be turning out the planned production of 25 hourly tons by Spring. Their product is 100% water soluble, according to **Eldon Freeman**, who with **Dean Rickman** operates the plant.

### NORTH CAROLINA

**Union Carbide & Carbon** has bought the 142 acre farm near Raleigh on which it has held an option. According to vice-president **Dr. G. H. Law**, it will be used generally as a test area, the first project being their newest, Crag brand pesticides. Dr. Law says the farm will cut materially the time between laboratory development and marketing.

### OHIO

**Royster** are building a \$500,000 plant at Piqua, said to be the fourth largest of its kind in the nation. **Six Industries** are general contractors.

### PENNSYLVANIA

**Central Chemical's** branch at Everett, producing fertilizers and crop chemicals, has installed a chain elevator and a 22,000 gallon nitrogen solution tank.

## TENNESSEE

**Shea Chemical** has invested more than \$5,000,000 in Tennessee during 1956, and may spend another \$7,000,000 this year. This figure, which is cited here because it suggests public relations methods for other plants, was spent for phosphate rock, wages, power from TVA and such items in addition to the expansion of its elemental phosphorus facilities, with which our readers are familiar.

## VIRGINIA

**Smith-Douglass** has announced Nutro Soil Corrector as an addition to their Nutro family of home and garden plant foods. The new product is "a combination of plant food elements with neutralizing qualities for sour and mineral deficient soils."

**American Oil Co.** awarded a contract to **Fluor Corp.**, for construction of a gas treating and sulphur recovery facility at its new refinery in Yorktown, Va.

## WASHINGTON

**Pacific Agro Company** opened up for business in Seattle on January 2. They are specializing in trace element fertilizers and home garden plant foods, and will formulate a complete line of crop chemicals.

**Link Distributing** of Grandview and **Shur-Crop** of Monroe are handling manufacture and serving as market bases for Pacific's farm chemicals and fertilizers.

**R. W. Cool**, who is also head of **Agro Minerals**, Tonasket; **Robert H. Allard**, formerly with **Wilbur-Ellis**; **Lee Fryer**, formerly with **Chas. H. Lilly** head up the concern.

## CANADA

**Canadian Industries** have announced plans to build a \$3,000,000 sulphuric acid plant at Copper Cliff, Ontario, to be ready by December. The planned 300 daily tons will be used for uranium processing by two local mines. They have a similar plant adjacent to **Inco's** Cooper Cliff smelter.

**Potash Company of America's** Canadian subsidiary will build in Saskatchewan a \$20,000,000 refinery with capacity for 1,500,000 annual tons of potash. **Stearns-Rogers** of Denver will engineer the plant, which should be ready in October of next year.

**Northwest Nitro-Chemicals** has shipped its first carload of ammonium nitrate fertilizer from the huge

plant at Medicine Hat. Output is rated at 140,000 annual tons.

**Quebec Ammonia** has purchased 90 acres of land on which to build a \$9,000,000 plant at Brockville, Ontario.

**North American Cyanamid** has announced an expansion program for its Beachville quarry, involving a new rotary lime kiln, and expansion of quarry facilities.

## ENGLAND

**Fisons Limited** announce the award of a contract to **Chemical and Industrial International, Ltd.** of Nassau, Bahamas for the construction of a 250 ton per day nitric acid plant to be built at their facilities at Stanford-le-Hope on the Thames estuary, London.

This plant was designed by **The Chemical and Industrial Corporation** of Cincinnati, Ohio, and will be constructed by Chemical and Industrial International, Ltd. who have the right to license C&I processes outside of the United States and Canada.

This is a single unit high pressure nitric acid plant and is the second plant of this type furnished recently in Europe where for many years the atmospheric type nitric acid plant has been used.

## GERMANY

**Knapsack-Griesheim**, has completed the program expanding its elemental phosphorus production capacity to 35,000 annual tons. They are a subsidiary of **Farbwerke Hoechst**.

## INDIA

The Ministry of Production has an-

nounced completed plans for their \$1,700,000 plant at Alwaye, Kerala. The operation, planned to produce 1400 annual tons of DDT and scheduled to be in production by June of 1958, will be managed by **Hindustan Insecticides Ltd.** Engineering has been awarded New York's **Singmaster & Breyer**.

## ITALY

**Potash Beds** already announced in Italy have been joined by the newest discovery — 25,000,000 tons of kainite located at Boasco.

## MEXICO

**Texas International Sulphur's** Mexican subsidiary, **Central Minera** will build a 1000 daily ton Frasch sulphur plant to cost \$3,500,000 on Tehuantepec. **Fish Service Corp.**, Houston, through its Mexican subsidiary, **Fish Service de Mexico** has been awarded the erection contract, and expect to complete the job by March of next year.

**Pan American Sulphur** has shipped its millionth ton from the Jaltipan Dome in Veracruz. Their current production rate is 200 daily tons.

## PAKISTAN

**Pakistan Industrial Development Corp.** at last report had not made the final decision, despite printed reports to the contrary, on the construction award for the two fertilizer plants at Multan in West Pakistan, and at Sylhet in East Pakistan.

They have gone into production with the PIDC fertilizer plant at Daudkhel, and expect to start deliveries in March. This is a 50,000 annual ton mixed goods operation.

Federal Chemical Company, Louisville, Ky., held its general sales meeting Jan. 10 and 11 to kick off the 1957 promotion of its new product—Federal Graduated fertilizer, a recent development by the company. More than seventy-five sales representatives from ten states and company officials gathered for sales and advertising sessions during the two day meeting.





# RESEARCH RESULTS & REPORTS

**One-shot** fertilizer application was forecast at the Winter meeting of American Society of Agricultural Engineers by Dr. Harry B. Walker, U of California. One pellet, he thinks, will contain all the plant foods needed during the growing season, to be released gradually as the season progresses. The labor cost saving is obvious. Not so obvious is how this will be done . . . despite the fine progress recently made in pelletizing fertilizer materials.

O

**Three quotes** that fell together on the editor's desk:

\*\*\*Dr. Robert Pearson of Alabama Polytech before the Beltwide Cotton Conference says research shows that as much as four times the nitrogen—from the present base of 26 pounds per acre—will jump cotton yield and, of course, lower production cost. 100 pounds of N per acre grow a bale per acre. It takes only 30 more pounds to grow the second bale.

\*\*\*Dr. W. A. Albrecht, U of Missouri commenting on research which shows that first year residual nitrogen produced corn yields large enough to pay much, if not all, of the cost of N applied prior to the previous crop year, indicates that the nitrogen used in the experiment paid for itself in two ways—by producing a greater yield both the first and second years, and by improving the crude protein content of the corn.

\*\*\*Extension agronomist, Mississippi, W. R. Thompson, preaches soil testing so as to use as much, but no more fertilizer than the land needs

O

**Crab grass** can be controlled with 2 or 3 applications of disodium methyl arsonate, but this chemical will damage blue grass if applied when temperatures are over 85 degrees. So says L. R. Quinlan, in charge of such studies at Kansas State.

O

**Peat** usage is the subject of a joint study by Minnesota chemists. The state is blessed with plenty—and for peat's sake they are trying to

find out what can be done with it that cannot be done cheaper with some other material. A comprehensive library of all known research on the subject has been assembled, and put on punched cards, so date can be brought up instantly as needed. And, of course, sampling of the various bogs is under way so as to give the chemists that basic information from which to start.

O

**Systemic** insecticide experiments are progressing well says USDA. Thimet (Cyanamid 3911) and the new Mayer 19,639 have both shown good results. Once in the sap stream, they retain for several weeks their ability to control various insects and mites. Of the four methods of application tested, treatment of cottonseed before planting with carbon dust mixed with 50% of insecticide seems to be best.

O

**Uranium** can be leached from lignite, according to Dr. Alex Burr, director of the North Dakota research Foundation, and the process produces a high quality fertilizer at the same time. Phosphoric acid applied to the ore separates the uranium from it, and the acid combines with the lignite, which is in turn united with ammonia in various forms. The difference in this process from previous methods is the substitution of phosphoric acid for the sulphuric previously used, Dr. Burr explains.

O

**Seed cone** have been produced in Douglas firs above the 2000 foot level of the Vancouver island mountains by artificial stimulation with chemicals and hormones, according to officials of MacMillan & Bloedel.

O

**Yield** is not the only criterion of fertilizer judgement, says Dr. C. F. Bentley, University of Alberta, Canada. Overlooked may be the effect on ripening, weed repression, reduced lodging for example from the use of phosphate fertilizers.

O

**Lime** is a durable benefit to the soil, as revealed by research at the University of Tennessee, where William D. Bishop reports not only on the basic catalyst effect of lime, but on the effects that may last for several years.

O

**Radioactivity** seems to be accomplishing a lot of things, not in themselves useful, but leading to mighty useful developments. The press was fascinated with the reports given at the FAO meeting by the European

Contact Group On Uses Of Isotopes and Radiation In Agricultural Research. They quoted such items as keeping potatoes from sprouting down cellar, growing roses on spruce trees and such. But the ECGOUOIARIAR more seriously showed good progress in their four major groups: corn production, soil preservation and enrichment, food preservation, and animal science.

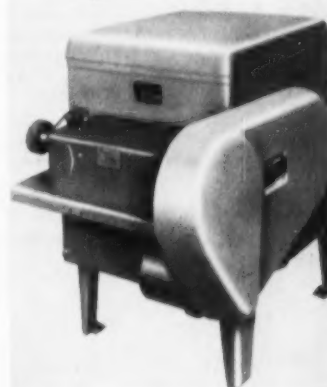
O

**Irrigated** soils and how to maintain their fertility is the subject of an expanded program at the University of California. Dr. Parker F. Pratt will direct the work, which includes lysimeter tests on large tanks filled with soil, checking the nutrients drained off with water running out.

Research in this study has already learned that the soil gradually shifts from acid to alkaline, as salts from irrigation water and fertilizer accumulate. They have also found a loss, over a 20 year period, of 22% of the total soil phosphorus. California Fertilizer Association and member companies are footing the bill for the equipment needed.

**But**, while radiation is speeding up our knowledge of plant breeding and the evolution of new crops; can speed up mutation and produce fascinating variations, the most recent, serious thought is that radiation is not likely ever to replace present breeding methods. As El Brendel, the comedian, used to say: "The old way was so much nicer."

This feeder, called the Rotodip Model 65, is designed around a rotary dipper wheel. Its accurate operation, its versatility, its adaptability to automation, and its many other features are described in a new bulletin which also contains several half-tone illustrations, a line drawing of a typical process installation, and dimensional drawings. For further information and assistance with your specific liquid feeding requirements and for your free copy of Bulletin 65-H12B, write Omega Machine Co., 345 Harris Ave., Providence 1, Rhode Island.



# Random

## NOTES & QUOTES

**No mules.** The Army is in the midst of a very serious problem. At least the agronomist of Ft. Carlson is. He is in the process of a 10-year improvement plan, with only 3 years supply of fertilizer left. And the Army has abandoned mules, substituting helicopters, which do agronomist Mirissey and his 10-year plan no good whatsoever.

**Camel bones** are the newest form of fertilizer being tested in Pakistan. Powdered, a concern there is making efforts to sell this new form of plant food to growers of rubber, tea, rice and vegetables in Singapore and Malaya.

**National Grange** quotes: "We can't afford to pay it' is a poor but currently necessary reason for rural opposition to proposed freight rate increases." It hits the farmer on two fronts—cutting off value from what he sells; adding to the cost of what he buys.

\*\*\*"Americans are not well fed compared to many sections of the rest of the world." For example, the US stands 13th in percapita consumption of milk and dairy products. Red meat consumption is less than 175 pounds per person, which makes us 5th in the world. But we lead everybody in poultry consumption.

\*\*\*"A new book, entitled 'The Agricultural Commodity Programs: Two Decades of Experience' deserves the attention of farmers everywhere." Murray R. Benedict, University of California, wrote it in collaboration with Oscar Stine, formerly of USDA. 20th Century Fund will sell it to you for \$5.

**Firman E. Bear** talked about two methods of fertilizer placement at the Agricultural Engineers. 1. Fertilizing the crop . . . the method used in new fertilizer areas or marginal lands, and consisting, of course, of band fertilizing. 2. Fertilizing the soil . . . building it to a high level of fertility to a depth of 8 to 10 inches, and maintaining the level.

\$200,000,000 are spent every year in the US to fight pests, protecting crops worth \$30,000,000,000. Since 1942, pesticides have saved 5,000,000 lives in the US and prevented 100,000,000 illnesses. The statistics are from the American Chemical Society.

**Range Station.** Florida points out that good management can arrange so pastures are at their best when grazing is needed most. And they point it out the hard way—by doing it. Dividing the pastures into sections, the fertilizer on a calendar which will provide rotation of fields . . . and then turn the cattle into the ripe field as the time comes. Not every section in the US can do this—but it should work in all warmer climate, long-season areas.

**CFA** is telling farmers to look to the potash content of the California soils, which are becoming potash-depleted due to consistent heavy cropping.

**Stabilizer.** Irrigation farming, when practiced throughout a farm community will stabilize the community economy at a high level. This from Dr. G. G. Williams, Olin Mathieson. Control over soil moisture, he points out, lets a farmer plant with confidence that he will make a crop. This is the clearest-cut, one-sentence argument for irrigation we have ever read anywhere. Olin Mathieson, as our readers know, is delving deep into the whole subject of irrigation.

\$1,000,000 is the total of checks DuPont is writing for grants to 122 universities and colleges this year. More than half the program is aimed at improvement of teaching. In a world where technology is King, teaching should be the Queen at least.

**Guarantee.** "Fertilizer labels are a farmer's guarantee of the fertilizer he purchases," says the Indiana State chemist. A good quote which we hope we will see re-quoted often in this Industry.

### O-M Chart Tells Safe Acid Handling

Up-to-date instructions for the safe unloading and handling of sulphuric acid are presented in easy-to-read form on a new 17 x 22-inch wall chart available from the Industrial Chemicals Division of Olin Mathieson Chemical Corporation, Baltimore 3, Md.

The chart is printed in two colors, red and black, on special moisture-resistant paper.

It describes step by step the proper methods for pump unloading and air unloading of tank cars, with special attention to cold weather procedure. Diagrams of piping arrangements are shown for both methods, as well as a list of safety "do's" and "Don't's."

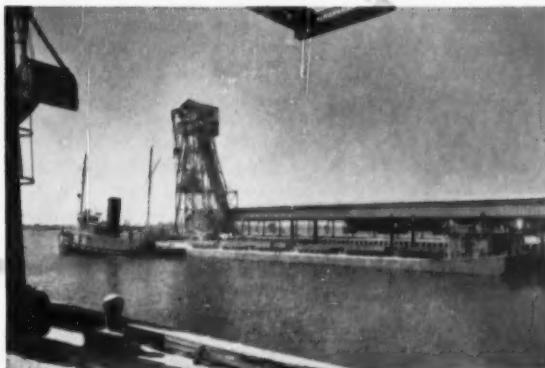
The chart also includes instructions for preparation of tank cars for the return trip to the manufacturer.

The Frank G. Hough Co., Libertyville, Illinois, has just announced that the entire line of four-wheel-drive "PAYLOADER" tractor-shovels will now offer Drott "4-in-1" buckets as optional equipment. This multi-purpose attachment has previously been available only on International-Harvester crawler models. In the rubber-tired front-end loader field, it will be an exclusive offering on the "PAYLOADER" line.



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# PRESENT CONCEPTS OF COTTON FERTILIZATION IN THE SOUTHEAST

ROBERT W. PEARSON\*

*\*Principal Soil Scientist, Eastern Section, Soil and Water Management, Agricultural Research Service, U.S.D.A.*

During the past decade there have been some remarkable changes in ideas about how cotton should be fertilized in the Southeast. These changes have been brought about primarily through research in soil management and through developments in agricultural chemical technology, although changing soil characteristics have also been a factor.

When the soils of the Southeast were first brought into cultivation, they were extremely deficient in phosphorus. They were also acid, generally low in potash and, of course, low in nitrogen. It was therefore logical that for many years recommended cotton fertilizers were higher in phosphorus than in potash. Since phosphorus does not leach but does accumulate in the soil, we now find after fifty or more years of such treatments the soils that have been in cotton much of the time have become relatively high in phosphorus and low in potash. As a result there is now a strong trend in the region toward raising the amounts of potash in relation to the phosphorus in cotton fertilizers.

While differences in present fertility levels resulting from past treatments are very important factors determining fertilization requirements among related soils, as for example within the Coastal Plain, we should also emphasize the inherent differences between some of the less closely related soil associations. The alluvial soils of the Mississippi Delta, for example, have a much higher native supply of mineral nutrients, such as phosphorus, potassium and calcium, than do most other soils of the Southeast. Similarly, there are differences between the heavier-textured soils of the Piedmont and the limestone valley areas and the lighter-textured Coastal Plain soils.

There is still another important difference among these soils that

strongly influences their productivity and consequently the maximum practical level of fertilization—moisture absorption and retention in available form. Some soils as for example in the Piedmont and the Brown Loam areas, are more droughty than others because of either a greater loss through runoff of the rain that falls on them or a lower available water-holding capacity.

These differences among the soils, both inherent and induced, together with the widely recognized fact that the farmer's greatest opportunity for realizing a profit on his operation lies in increased per acre yields, form the background against which I would like to discuss several specific points of cotton fertilization. We will limit ourselves to "crop fertilization" as contrasted to the so-called "soil fertilization" practice advocated in some areas.

## NITROGEN

Nitrogen has always been one of the first limiting factors for cotton production in the Southeast. It was deficient in the virgin soils and does not accumulate from fertilizer applications; so it will continue to be one of the most important fertilization problems. The most recent figures we have show that on the average only about 26 pounds of N per acre are being used on cotton in the Southeast. The cotton crop must take up about 100 pounds of nitrogen per acre in order to produce the first bale of lint, and each succeeding bale requires at least 30 pounds more. Since the native soil nitrogen is very limited and the recovery of applied nitrogen is always poor—ranging from 25 to perhaps 60 percent, it seems axiomatic that rates of application must be increased sharply over present practice where yields above the bale-per-acre level are expected. This statement will probably bring

up pictures of excessive weed growth and late maturity with their attendant problems. We all know the traditional fear of too much nitrogen on cotton, and without the advantages of improved methods of insect control, defoliant, farm power machinery, etc., there would undoubtedly still be reason to stop at 60 pounds of nitrogen. Rates actually being used in some sections, for example in the Mississippi Delta, are much higher today than we would have dared recommend a few years ago, and experiments have shown that much higher rates still can be used without serious danger provided other management practices are adjusted accordingly. For example, in an experiment at Thorsby, Alabama, carried out by the Agricultural Research Service and the API Agricultural Experiment Station in 1955 and 1956, nitrogen rates up to 360 pounds of N per acre were used both with and without irrigation. In neither year was any reduction in yield found even from the highest rate of nitrogen and water application. The very high amounts of nitrogen with moisture did favor more lush vegetative growth, considerable lodging and delayed maturity which made picking a problem and required more intensive weevil control and the use of bottom defoliation. While such rates are much above practical recommendations it is necessary to learn how the crop reacts throughout a wide range of nitrogen application before safe levels of fertilization can be determined.

Results of many field experiments in this region show that on the average there has been little response to nitrogen beyond about 60 pounds per acre. Keep in mind, though, that the yield level even on experimental plots has generally been a bale or less per acre due to myriad other environmental factors—lack of moisture, unfavorable temperature, nematodes, boll weevil, nutrient unbalance, salt damage, toxic substances, and soil acidity, to mention a few. High rates of nitrogen would

*Presented at the 2nd Annual Beltwide Cotton Production Conference, Birmingham, Alabama, December 13-14, 1956.*

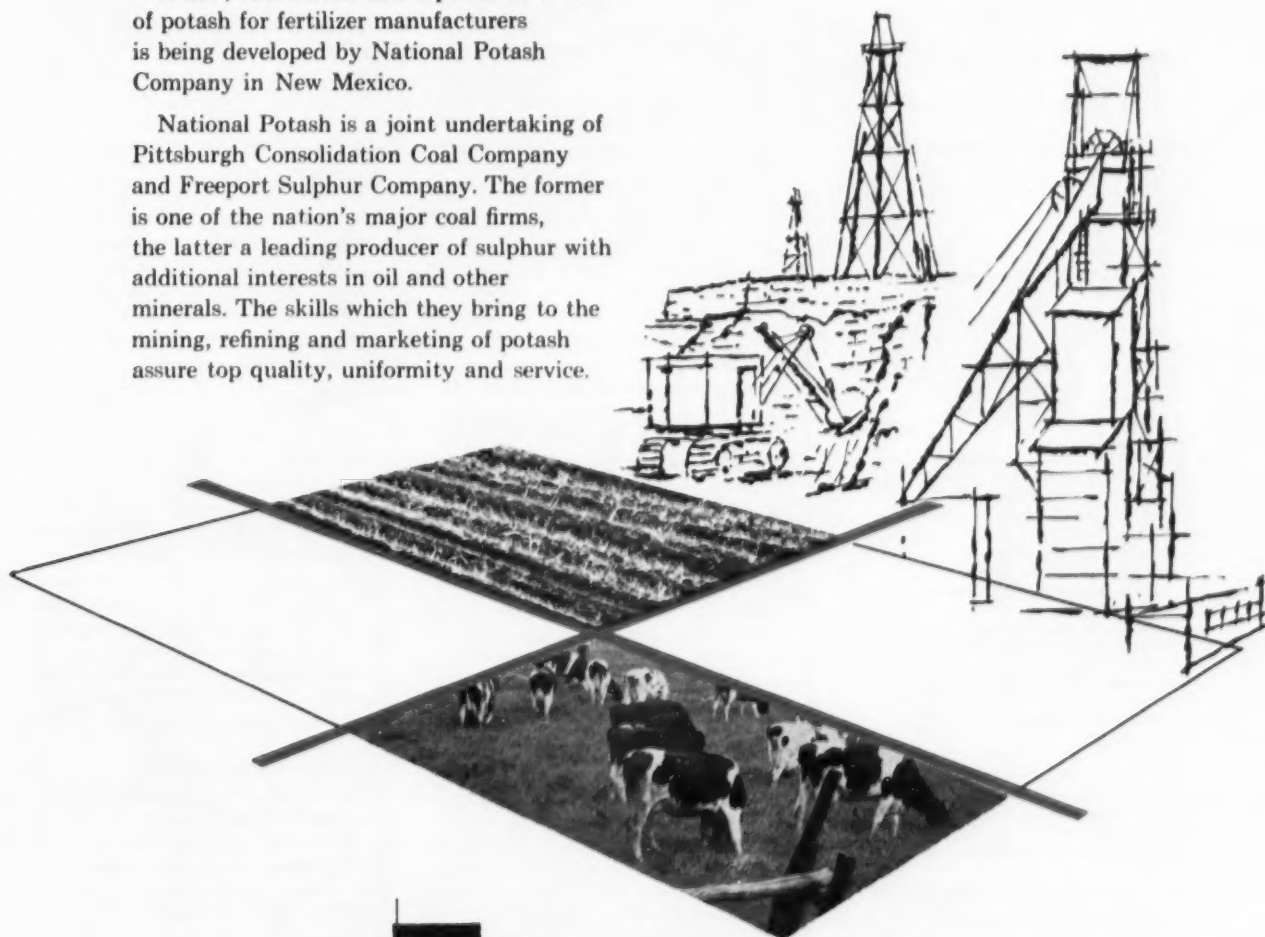




## *a joint venture in Potash*

A new, substantial and dependable source of potash for fertilizer manufacturers is being developed by National Potash Company in New Mexico.

National Potash is a joint undertaking of Pittsburgh Consolidation Coal Company and Freeport Sulphur Company. The former is one of the nation's major coal firms, the latter a leading producer of sulphur with additional interests in oil and other minerals. The skills which they bring to the mining, refining and marketing of potash assure top quality, uniformity and service.



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only be indicated where the total growth conditions can be controlled at least to the extent of raising yield level expectations to two bales or more per acre. Results from experiments at the Delta Branch Station at Stoneville, Mississippi, show consistent yield increases to 100 or more pounds of nitrogen fertilizer per acre in the better cotton years.

There are now available a number of nitrogen fertilizer materials such as urea, ammonium and nitrate salts and anhydrous ammonia. Nitrogen solutions are simply mixtures of these materials in a solution. While various advantages have been claimed for the different sources, research results show that, pound for pound of nitrogen, these materials are about equally effective provided lime and potash are not limiting factors. The selection of a material should be based on price per unit of nitrogen and the availability of equipment for application. There are certain adjustments in other management practices that are influenced, however.

Even as brief a discussion as this of nitrogen fertilization should mention the use of winter legume cover crops as a source of nitrogen. Although the practice has very limited acceptance among farmers, we should recognize that under proper management the equivalent of 60 to 80 pounds of fertilizer nitrogen can be added to the soil in a legume winter cover crop such as vetch or crimson clover. The key is the amount of growth made before the crop has to be turned under, and this is in turn determined to a large extent by the time of planting and the level of mineral fertilization and lime.

#### LIME

And this leads directly to the next problem I would like to talk about—lime. In our preoccupation with making the most effective use of fertilizers, lime has often been neglected. As yield levels are pushed upward and more intensive management practices become standard operating procedure on the farm, soil acidity looms as one of the major limiting factors in cotton production. Recent soil test laboratory summaries in the Southeast have shown that from  $\frac{1}{3}$  to  $\frac{1}{2}$  of the soils are too acid for best growth of cotton without liming. Several recent field experiments have shown yield increases up to 500 pounds of seed cotton for liming even where the soil was not strongly acid. Under these conditions it would be impossible, of course, to get full benefit from a progressive fertilization pro-

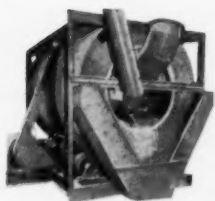
gram.

The necessary trend toward higher and higher rates of nitrogen fertilizer is one reason why the soil acidity problem is one of growing importance. Many of the commonly used nitrogen sources have a residual acidity when applied to the soil. A 200-pound application of nitrogen in the form of ammonium nitrate, anhydrous ammonia or urea, for example, would require about 400 pounds of limestone to neutralize this acidity. So it is easy to see that repeated applications of fairly high rates of these nitrogen fertilizers, even for a very few years would seriously aggravate the need for lime that already exists in many of our soils. Present lime use in most of the South is hardly enough just to neutralize residual fertilizer acidity much less take care of leaching and crop removal. There are also definite signs that magnesium is becoming deficient in our sandy soils. As general use of mixed fertilizers neutralized with dolomite decreases, this problem may become more serious. Of course, the solution is simple—an adequate liming program based on soil test laboratory recommendations.

As soils become more acid, the supply of available bases, such as calcium and magnesium, decreases. A number of other unfavorable conditions may also develop. One of these is the presence of excessive amounts of soluble manganese in the soil. Cotton grown under these conditions may develop "crinkle leaf," which is apparently due to manganese toxicity and causes reduced yield and even death of the plant in severe cases. This problem has been observed in Arkansas, Louisiana, Mississippi, and Alabama and has seemed to occur with increasing frequency during the past few years. The soil condition that causes this trouble can be corrected by the proper use of limestone. A general program of liming according to state soil test recommendations would solve the crinkle leaf problem.

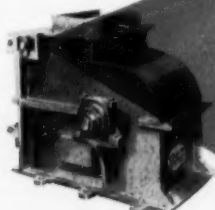
#### PHOSPHORUS

I have already indicated that soil phosphorus is not nearly as deficient in the cotton producing areas of the Southeast as it was originally. This should not be taken to mean, however, that phosphorus can be left out of the fertilizer altogether. Although the yield increases that are generally found for phosphate fertilizer are considerably lower now, there is seldom an instance reported of no increase, and the ad-



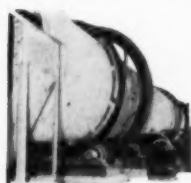
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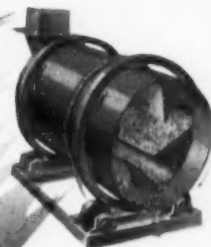
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vantage of having the crop get off to an early, vigorous start is alone well worth the cost of the average phosphorus application. Cotton is a unique crop in its response to applied phosphate fertilizer in that some yield increase almost invariably results from additional increments of fertilizer, even at very high rates. Of course, a point is reached usually at or below about 50 pounds of  $P_2O_5$ , where the yield increase is not enough to justify the additional phosphate.

The amount of phosphorus that should be used will vary greatly depending upon the level of accumulated phosphorus from past fertilizer treatments. This is where the soil testing service can be a lot of help. The amounts of available soil phosphorus shown by their analysis reflects past fertilization and permits making a recommendation that takes advantage of this accumulated reserve. This situation, incidentally, explains why the soil testing laboratory is more necessary today than ever before. Originally, the upland soils of this area were so uniformly low in available phosphorus that a recommendation could be made almost without regard to the soil nutrient supply.

Sources of phosphorus for cotton are at present pretty well determined by the methods of manufacture of the mixed fertilizers in which it occurs since phosphate materials are seldom used alone. In the past these mixed fertilizers were almost universally produced by moderate ammoniation of ordinary superphosphate resulting in a product having a considerable amount of water soluble phosphorus, perhaps as much as 65 per cent, and a relatively large amount of calcium sulfate. The rest of the phosphorus was also present in a relatively available form for plants. Technological advances in the fertilizer industry have resulted in a strong trend in the past few years toward higher levels of ammoniation, using

triple super. The product has half or less as much water soluble phosphorus, and the balance of it is theoretically, at least, less readily available to plants. Also, sulfate is generally absent from these mixtures unless it is added purposely. We do not know precisely the extent to which these shifts in phosphate solubility may affect cotton yield, but research is in progress on this question. We feel certain that some water soluble phosphorus is desirable, and we know that extreme degrees of ammoniation, resulting in the formation of basic phosphates, is undesirable from the standpoint of phosphorus availability.

#### POTASSIUM

Intensive cultivation with generally inadequate potash fertilization has depleted the already limited native soil potassium reserves to the point that deficiencies of this element have often limited cotton yields in the Southeast. According to a recent survey an average of only about 20 pounds of potash was used on cotton in the Southeast in 1950. In a few of the finer textured, more fertile soils of the region, potash is seldom required in large amounts, but on the sandy soil, as for example throughout the Coastal Plain, rates up to 60 pounds of  $K_2O$  are quite commonly required even at the present levels of production, and instances of response to higher rates have been reported. This is not surprising when we consider that a cotton crop has to absorb between 120 to 150 pounds of  $K_2O$  in order to produce one and one-half bales of lint. Most of this potash is in the stalks and leaves, and is not removed from the land, which helps keep losses down. There are definite leaching losses of potassium in the sandy soils though, as well as considerable fixation of available potassium to less available form in most soils. This means that we will never build up the potassium level of most cotton soils to a point where we can omit or drastically reduce

the amounts of this element in the cotton fertilization program. And this brings up another point that should be mentioned. Lime and potash affect each other's availability to plants in that if both are deficient or even approaching deficiency and one is added in liberal amounts, it will often cause a serious deficiency of the other one to show up. Since many of our cotton soils are both acid and low in available potash, this interaction should be kept in mind when deciding on fertilization treatments and again underscores the importance of an aggressive liming program.

#### SULFUR

A few moments ago, we touched on the question of sulfur by mentioning that the tendency toward high analysis mixed fertilizers is often accompanied by elimination of sulfur as one of the incidental, though very important, constituents. During the years past, there has been little concern over the possibility of sulfur deficiencies in cotton because the fertilizers generally contained ample supplies both from the ammonium sulfate used as the solid nitrogen material and from the ordinary superphosphate. As more and more triple super is used and ammonium nitrate has replaced ammonium sulfate, there is reason for us to become concerned with the sulfur requirements of cotton.

This problem has been recognized as one of growing importance in the South, and some excellent work has been done by the Alabama Station both in earlier and in more recent years. As a result of the increasing importance of this problem, a research project was started in 1951 by the Agricultural Research Service in cooperation with each of the Southern Agricultural Experiment Stations. This joint study has shown so far that the soils throughout the cotton belt contain an average of only 6 pounds of extractable sulfur in the plow layer, although there are accumulation of absorbed sulfate at a lower depth in most soils. As yet we do not know how available this subsoil sulfur may be, but the question is being intensively studied.

Outside of fertilizer additions, there is no way for this sulfur content of the soil to be increased except through the small amounts brought down in the rainwater. This has been found to be only 6 pounds on the average per acre annually in the Southeastern cotton belt. Repeated cropping using high analysis sulfur-free fertilizers has already

#### INDUSTRY CALENDAR

Date	Organization	Place	City
Feb. 14-15	Middle West Soil	Edgewater Beach	Chicago, Ill.
Mar. 4-5	Southern Safety	John Marshall	Richmond, Va.
Mar. 6-8	NAC	Fairmont	San Francisco
June 9-12	NPFI	The Greenbrier	White Sulphur Springs, W. Va.
June 17-19	Sou. Control Officials	Dinkler-Tutwiler	Birmingham, Ala.
July 10-14	Plant Food Producers of Eastern Canada	Manoir Richelieu	Murray Bay
July 17-19	SW Fert. Conf.	Galvez Hotel	Galveston, Texas



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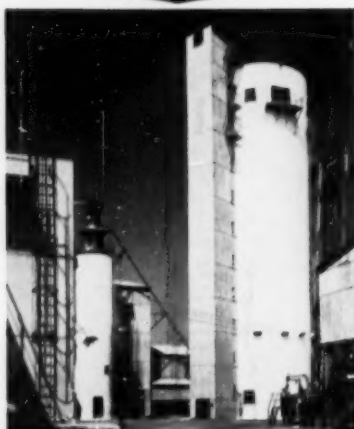
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shown that serious sulfur deficiency will occur on many of our productive soils within a period of only 2 or 3 years. In the regional sulfur project, for example, increases in seed cotton yields from adding sulfur ranging from 100 to 500 pounds were found in the third year after discontinuing the use of sulfur-containing fertilizers at six experiment sites in several states. In all of these instances, the addition of only 8 pounds of sulfur as calcium sulfate was enough to give maximum yield as far as this element was concerned.

The pattern that is emerging from this most recent study is consistent with findings of earlier short-term experiments, and strongly suggests that fertilizers to be used with cotton in the South should contain a minimum of 8 pounds of sulfur in a soluble salt form.

### **MINOR ELEMENTS**

The cotton plant seems to be able to satisfy its minor element needs even under conditions of very low soil supply. There have been reports of response of cotton to boron both in Mississippi and South Carolina, but judging by the very few instances reported in the region, it seems likely that this group of nutrients are not considered to be a problem at present by most soil scientists.

### **PLACEMENT**

The question of fertilizer placement for cotton is far from being a new one. The principles of placement have been known for years. About 25 years ago, for example, 76 experiments were carried out across the South in a coordinated study of this problem. The results from that study are perfectly sound, qualitatively, today for the solid materials. Loss of stand and yield reduction invariably followed when the fertilizer was placed either in contact with or directly below the seed, even at several inches below the seed. Best placement was in bands to the side and below the seed, which gave good positional availability to the young plant without danger of direct contact with the seed. In spite of the fact that we had recognized the ill and had known the cure for years, cotton yields are still being cut on many fields by improper placement. And the damage increases sharply as rates of fertilizer go up. As we have already noted, potash and nitrogen should be increased relative to phosphorus in most areas. They are the materials that cause salt damage, and the damage is greatest in sandy soils

where generally the need is greatest for higher rates—a sort of self-aggravating problem. It seems likely in retrospect that much of the advantage for side-dressing application of nitrogen over application at planting may in fact have been due to reduction of salt injury as much as to increased efficiency of nitrogen utilization, at least in medium to fine textured soils. This point should be checked further to reevaluate the effect of time of application at rates currently being recommended and in the absence of any possible salt injury.

Placement with anhydrous ammonia and nitrogen solutions poses a somewhat different problem. In general, anhydrous ammonia is preferred as a preplanting application around 5 inches deep in the row. The ammonia creates a zone of intense alkalinity for a short while, after which the soil gradually returns over a period of several weeks to a slightly more acid condition than at the beginning. When used as a side dressing the application should be as far from the plant as the stage of root extension would permit. We have practically no research information on placement of nitrogen solutions for cotton. Since we know their composition, however, we can arrive at the conclusion that they should be placed beneath the soil surface to prevent volatilization loss, and must be kept 2-3 inches to the side and below the seed to avoid damage.

### **SUMMARY**

Present actual average rates of use of nitrogen on cotton in the Southeast could profitably be increased at least fourfold on the better cotton soils **provided other management practices are improved at the same time.** Rates of phosphorus and potash also should be increased but to a less extent and in accordance with soil test recommendations.

Soil acidity is undoubtedly a limiting factor for cotton production on a relatively large acreage, and the severity of this condition will increase rapidly as the rates of nitrogen used go up. An aggressive liming program is the only solution to this problem.

Sulfur is an element that will cause increasing trouble if the swing to higher analysis fertilizers continues and if provision is not made for purposely including it in the mixtures.

More attention must be given the proper placement of fertilizer to prevent seedling damage and still to retain the positional availability of the fertilizer for the young plants.



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# Safety

After we became members of the Fertilizer Section of the National Safety Council, we began to realize how little we had known about making our plant a safe place to work. Safety up until that time had been more or less delegated to something similar to the role of a 4th string quarterback, say at some small town high school. Frankly, safety did not have a very important part to play in our plant. It was then we decided safety was to be our 1st string quarterback; we have found there is no substitute for safety. Also, that you can insert safety anywhere or at anytime into your lineup and it will improve the whole team.

Planning a safety program for our Plant Committee for the past four years has required a lot of time and effort. And since I am not a safety engineer, I have had to depend entirely on the speakers at these meetings, along with literature supplied by the Council. Our Plant Committee has done a splendid job of selling safety to the men in the plant. The past four years have been the safest years we have ever experienced.

One cannot cast aside the uncanny accuracy of the predictions of our National Safety Council. When the Council predicts a certain number will die, they generally die. There is no need for the "slaughter" which takes place on our highways. And, when the drivers of automobiles heed the advices of the Council, it will stop! If we heed the advices of the Council, our accident records in the fertilizer industry will show a decided improvement. The improvement in our accident record speaks for itself.

"The Plant Safety Committee" and its functions is the subject of this paper, but first I want to tell you the difficulties we experienced with our so-called safety program before we joined the "Fertilizer Section."

We believed we were sincere in our efforts—our meetings were held regularly—but there was friction. We listened to much wrangling, idle talk, excuses, and even grievances

## THE SAFETY COMMITTEE IN THE PLANT

By C. S. GRIFFITH, Supt.  
Virginia-Carolina Chemical Corp.  
Cincinnati, Ohio

were aired. We seemed to lack the proper approach. We had no worthwhile program. Our committee appeared to be a gang of men more interested in getting out of work to attend a meeting than in the safety of their fellow workers. We accomplished very little, with the result, our accident record grew steadily worse. We thought our terrible record was due to employing so many new men during the rush of our shipping seasons. We blamed our record on the carelessness of these new workers. We neglected the safety of our men in order to increase our tonnage. We thought lower costs were more important than the safety of our men. Some even thought we were unlucky. We made ourselves believe all of these things because we did not know enough about safety! Certainly there must be other plant superintendents and supervisors in this audience who have had similar experiences. And, it is to these gentlemen we shall direct our remarks—with the hope that some of the safety ideas we have learned may be helpful to them.

A few of our safety ideas may be original, but in the main we depend entirely on the literature supplied by the Council, and the speakers we have heard at these meetings. This material is used to prepare the monthly program for our plant committee — and the committee takes over from there. Their job is to sell safety to the workers and they are doing a wonderful job.

We operate with a working Safety Committee of 15 men. Every department in the plant is represented—from the sulphuric acid plant to the office. Each member is required to wear his Green Cross Safety Emblem at all times in the plant. Our meetings are held once each month, generally a day or two before the end of the month so that plans may be made for the approaching month. And, when it is felt necessary, the

committee is authorized to call a special meeting to discuss any safety problem that may be troubling them. The minutes of each meeting are properly recorded and our Home Office in Richmond, Virginia is given a copy of the highlights of each meeting.

Since we are a small plant and have no safety engineer, this duty is naturally assumed by the superintendent. And, even though he may be busy with other duties, we think it most important he should always be present at every safety meeting. Safety is not a one man job. It's not just the job of management. It's not just the job of the man in the plant. It's not the job of a few foremen. It's the full time job of every one of us—preaching, talking and living safety. We have actually talked safety so often in the past four years that we have wondered if it were becoming somewhat boring. But since our record continues to improve, we most certainly will not discard a successful program. Therefore, we shall continue to preach safety in our plant every minute of the day, for that is what it takes to have a safe plant. There can be no let down in safety.

You may have heard this little story about a safety engineer. Two wives were talking about their husbands. One said, what does your husband do? The other replied, Oh, my husband is a safety engineer. Well, what in the world is a safety engineer? Well, she replied, if you and I did it, they would call it "nagging"!

Now, contrary to former beliefs, we have found that a good safety program in a small plant costs very little from a monetary standpoint. In fact, other than the expense of an attractive, well lighted safety bulletin board, the entire expense of our monthly prizes for slogans and other incentives has been borne from the proceeds of our plant vending machines.

Our committee offers a prize for

Presented at Fertilizer Section, National Safety Council, Chicago—Oct. 22, 1956.

the best safety slogan of the month, which is open to every employee in the plant. And, we have had as many as 35 slogans entered in a month, some of which were excellent. The winner's slogan is placed on the board with his name listed as winner and remains for all to see for the entire month, until the next winner is chosen. Keen interest is always shown on the day the committee meets to select a new slogan winner.

Our committee also adopted a suggestion made by one of the speakers at these meetings—distributing a few silver dollars to employees who could answer correctly, questions on safety. With this, we have had wonderful results! An employee may be asked to describe fully the safety poster located directly above the time clock. Or he may be asked how many days our plant has operated without a lost time accident. He may be asked to give correctly the winning slogan on the board or the auto speed limit posted on sign between the office and the dressing rooms. He may even be asked to tell one joke he has read in the booklet "Safe Worker." If he can answer the question correctly, he is handed a silver dollar. If incorrectly, he is passed up and told to go get the correct answer. It's a good bet this employee will be able to answer correctly the next time we give away silver dollars. We know of no better way to make the workers more observant of the important safety notices posted throughout the plant.

We have also learned that incentive awards used in any accident prevention program do pay excellent dividends. We have found it is not so much the value of the prize that stimulates the interest. The employee is made to feel he has a part in the program, he has been recognized. He is made happy with this recognition. And, gentlemen, happy workers are safe workers.

When we decided we were going to make our plant a safe place to work, we saw the need of a set of general safety regulations and the following regulations were drawn up:

- No. 1: We are sincere in our effort to prevent accidents. Neither you nor the company can afford the losses that accompany an accident.  
No. 2: This plant and its machines have been made as safe as possible. As new hazards are discovered, corrective measures will be taken.  
No. 3: Each employee should report all unsafe conditions in his work.

No. 4: No employee is expected to undertake a job until he has learned to do it and is authorized to do so by his foreman.

No. 5: All injuries must be reported immediately.

No. 6: Compliance with safety rules is a condition of employment. If you can't work safely—you can't work here!

No. 7: The safety committee will be constantly watching your work. You will be shown the safe way to do each job and expected to always do it the safe way.

No. 8: We have learned accidents don't just happen. There are definite established causes and can be prevented.

No. 9: Learn your foreman's name and heed his advice. Your foreman is a member of the plant safety committee and is anxious to help you work safely.

No. 10: Horseplay is not permitted. Do not distract or interfere in any way with a person performing his job.

When the committee asked for these safety regulations, they were drawn up promptly, as all things pertaining to accident prevention should be. At our next meeting the new regulations were presented to the committee. A motion was made to post them in every conspicuous location in the plant, and that no new employee should ever be allowed to enter the plant until they had been read slowly and carefully to each. The man who presented this motion is one of the most active members of our committee. He only has one arm, the other having been lost several years ago in a pulley accident—in our plant. This man knows the importance of a good safety program.

Realizing that a workable safety program must include every employee in the plant, our committee welcomes suggestions from every worker. At some of our meetings when the entire plant personnel is invited to attend, we receive many excellent suggestions. The suggestions we receive indicate these men are thinking.

We have had several near accidents on our shipping and unloading platforms, where fork lift trucks are moving from the machines into box cars with bagged goods. And, where payloaders leave cars of bulk materials. One suggestion we received was that we install "red" flasher lights along these areas, and that they be flashing when these machines are in operation. We have not had any worries since the flashers

were installed. One becomes alert the moment he sees these "red" lights flashing. Our committee has been highly complimented for this suggestion. Stop signs at blind corners have been installed. No operator of lifts or tractors would think of passing one of these signs without coming to a complete stop.

Reckless or unsafe operation of tractors or lift machines will not be permitted. The committee is continually watching for violations of this rule.

No new operator is ever placed on a tractor or lift truck until he has been fully trained in the hazards of the operation.

No adjustments, repairs or cleaning is ever permitted on any machine or any equipment until the power has been shut off and the machine stopped.

No person is ever allowed to work under a load supported by a jack or chain hoist. Blocking or cribbing must support the load in a safe manner.

Defective equipment must be repaired immediately or removed from service until repairs have been made.

Goggles or shields are provided and must be worn while working on all tank cars of acid or fertilizer solutions and at all grinding wheels.

No employee is allowed to operate any piece of repair shop machinery except a member of the repair force.

We are very proud of our house-keeping and have always felt this plays an important part in accident prevention.

We believe our dressing rooms should be kept clean. To give a man a clean dressing room encourages him to keep his working area clean.

Our committee has locker inspections and we occasionally give away a few silver dollars for the four cleanest lockers. Before we started these inspections, most of the lockers were piled high with old work clothes which would never be worn. This situation has improved and while we are not entirely satisfied with this particular program, we know we have made some headway. We believe a few silver dollars distributed to those with clean lockers will finally gain for us the desired results.

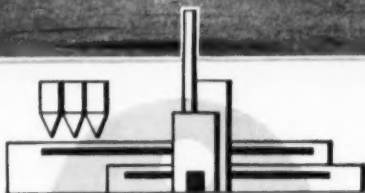
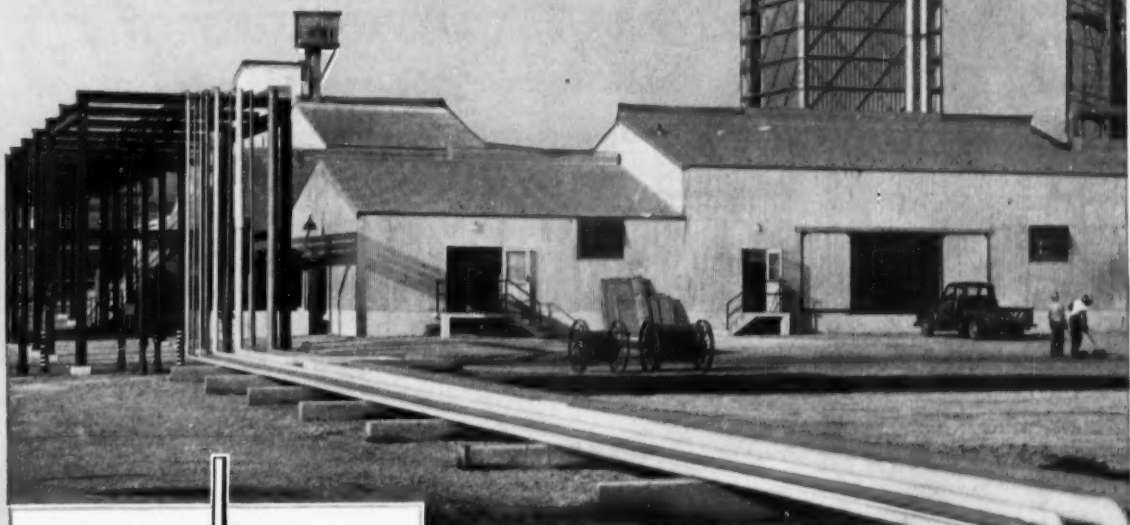
These things and many more are being watched constantly by our committee members and corrected the moment some worker forgets.

We think it of utmost importance to have men on a safety committee who have demonstrated their de-

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PRILLED AMMONIUM NITRATE is produced at this modern plant of Brea Chemicals, Inc., Subsidiary of Union Oil Company of California, Brea, California. Link-Belt equipment includes special dust-tight oscillating conveyors, coating drum, vibrating screens, pre-dryer and dryer, cooler and belt conveyors. In addition to ammonium nitrate, Link-Belt's vast experience applies to dry-mix, superphosphate, ammonium phosphate, ammonium sulphate, urea, granular and other types of fertilizer.



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3. **FABRICATE THE EQUIPMENT**. Link-Belt makes a complete line—will also supply special requirements.
4. **ERECT THE PLANT**, providing crews and supervisory service.
5. **START THE OPERATION**, with field engineers ready to make final adjustments.

In addition to normal production demands, requirements of this new Brea Chemicals, Inc. plant called for special processing equipment and dust control efficiency. Through Chemical and Industrial Corporation, engineering-construction contractor, Link-Belt supplied standard and specialized equipment to satisfy these requirements . . . has helped maintain full-capacity output and top product quality.

Link-Belt stands ready to cooperate with your engineers or consultants in supplying the exact equipment your process requires. Or, with a unique 5-phase "turn-key" service, Link-Belt can set up your entire operation . . . handling every last detail under a single, all-inclusive contract. To learn more of the savings this service can bring you, call your Link-Belt office. Or write for Book 2459.

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ROBERT BOLLING**

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inventory of  
20-million-  
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user**

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cost, space, handling  
and inventory control**

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The opportunities for more efficient control were first pointed out by Packaging Specialist Robert Bolling of Union. With the consent of the manu-

facturer, Bolling then surveyed the company's complete bagging operation. The new Specifications Manual was one of the results. Savings are expected to run well over \$100,000.

Union Multiwall Specialists have helped many companies effect substantial economies and gains in Multiwall performance.

Ask about Union's 5-Point Packaging Efficiency Plan, and how you can take advantage of it without either cost or obligation.

**Union Multiwall Recommendations  
are based on this 5-point  
Packaging Efficiency Plan**



- DESIGN
- EQUIPMENT
- CONSTRUCTION
- SPECIFICATION CONTROL
- PLANT SURVEY

**Better Multiwall performance  
through better  
planning**



UNION'S PACKAGE ENGINEERING DEPARTMENT will study your Multiwall bagging methods and equipment and make appropriate recommendations, regardless of the brand of Multiwalls you are now using.

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sire to work safely. The members of our committee are men who are willing to assume the responsibility of protecting their fellow workers.

Every member of our committee is pledged to perform each and every job in a safe and sane manner. He is pledged to correct any employee found performing a job in an unsafe manner. He is pledged to report to the Safety Committee or to the supervisor in charge, every unsafe condition found in the plant. And, since every department in our plant is represented on the Safety Committee, we have the entire plant policed at all times.

I am not considered a member of our committee. I am considered a representative of Management who has agreed to prepare the program and to attend each meeting. My job is to see that the committee has full authority to carry on their accident prevention program unhindered. To take their suggestions for improvements and to see that our repair organization replaces a certain ladder or rebuilds a certain hand rail or machinery guard which may cause an injury. Your Safety Committee must have your full support if you are to have a safe factory.

Most of our meetings are of a serious nature as we will not take a chance on safety. However, we do vary our programs from time to time with a back door approach to safety. We believe it stimulates interest to insert a little humor now and then.

On one occasion we discussed our ideas about a humorous program and the committee was anxious to give it a trial. So, we shut down the plant and invited every employee in the plant to meet with the committee. Possibly 70 to 80 men attended this meeting, all wondering what was in store for them.

The chairman of the committee informed the group we were having a special meeting. And, as safety was a job for each and every one of us, they were to take part in this special meeting.

We had prepared 10 short paragraphs on "Safety in Reverse" and at this point we asked for ten volunteers who would be willing to read these papers. Finally ten men either stepped or were pushed forward by the group and each was handed his part to read. Time does not permit me to give you all of the ten papers, but we do want to give you the three that brought forth the heartiest laughter.

One man stepped forward and in a very heavy voice read: "Always

climb a ladder with both arms full of tools. Don't allow anyone to help you. Show them how easy it is to break a leg."

Another man stepped forward in an equally heavy voice and read: "Always hurry—run every step you take and it won't take long to bust your brains out."

Another man with a slightly squeaky voice read: "Always keep your safety shoes in your locker—save them!! Wear those old worn out street shoes. You can get along without a toe or two. It just looks bad when you're barefooted."

I have never heard heartier laughter in my life. And, believe it or not, we operated for almost thirteen months before we had our next lost time accident, which is the present record at our factory. This is why we believe a little humor is most essential in an accident prevention program.

We use in our programs "The 5 Minute Safety Talks for Foremen." These short talks are generally read by some member of the committee when the entire plant personnel is present. We believe they have helped tremendously in our program.

We also use our company Safety Letter each month. This letter covers all of our company's plants and describes fully the injury and how it occurred. The Safety Committee takes these accidents one by one. We try to re-live the accident to see if we have the same problem at our factory. If we do, we go to the scene and find some way we can avoid this type of injury to one of our men. In every case, we try to lock the door before the horse gets out.

If a fatal injury has occurred at some other plant, we call a general meeting for all employees and cover this condition thoroughly.

Our Home Office has been very helpful to us in our accident prevention program.

Our company magazine often carries excellent articles on safety. One last spring entitled "Don't Invite Darkness" was read to our committee at our March meeting. And, immediately the committee went into action to protect our workers from "eye" injuries.

Our committee is not only interested in preventing accidents, but what should be done when an accident happens. We also have fire prevention meetings and discuss the hazards involved, particularly in or near buildings which house inflammable materials.

About a year ago our committee appointed one of their members, a mechanic, to make a thorough inspection of our plant each week. His job is safety inspector for the plant. This inspection has revealed several dangerous places in our factory where an injury could easily occur. This inspector reports to the committee and immediate authority is given to correct any hazardous condition found.

I must admit, we have learned our safety the hard way. We know what it is to wrap up a man's arm in wrapping paper and call the coroner for instructions as to its disposal. We know what it is to dig out a man, completely buried by a cave-in of some fertilizer stock. We have given artificial respiration to a man for thirty minutes who was already dead when we reached him. We have had to go to a man's wife and tell her of a serious injury to her husband. Don't let it happen to you. Start your safety program in earnest today!

We mentioned previously the excellent safety slogans entered each month in our contest—and very appropriately the winning slogan on the day we had completed 365 no lost time days read: "One year ago to the day, safety first was pledged to stay."

And after we had our first lost time accident in 13 months, the committee selected this slogan as the winner: "Safety was here and went away, let's all bring it back again to stay."

Another of the better slogan winners was in last February's contest. It read: "Let's make March a safe march, instead of a death march."

We knew when our employees were thinking up these excellent slogans, they had to be thinking of safety.

Now in closing, we have tried to give you a clear and practical picture of how our plant Safety Committee operates. We have never been able to pin point any one part of our program which could be said was more important than some other, but we do know that somewhere along the line, all of us working together have accomplished something worth while. Some day we shall know the answer. And when we do—I personally believe you will find that friendliness and safety go hand in hand. A kind word is just as important as a guard around a pulley.

Many of us heard Mr. Foresman last October talk on Safety and Human Relations. When I returned to

Cincinnati after that meeting, I prepared a short paper and read it at our very next safety meeting. It was so well received, the committee asked if I would consent to read it at every meeting in the future. I of course agreed to do this. This is what was read to them:

(1) Always remember—Each man working under your supervision is human—flesh and blood just like yourself. (2) He has his worries just as you do. (3) He may have a child, wife or mother who may be sick, the same as your family. (4) He may have financial difficulties the same as yours. (5) He would like to be treated kindly the same as you. (6) He doesn't like the boss to scream at him when he makes a mistake—neither do you. (7) He would prefer being called aside and any reprimand be given in low tones. (8) He is embarrassed when the boss screams at him. (9) He knows he is in for a ribbing from his fellow employees when these things happen. (10) He becomes nervous and irritable and in this condition is easy prey for an accident. (11) He will like you and you will like him, if you will always remember he is flesh and blood, the same as you. (12) He will like a cheery good morning,—a little smile,—even a hearty laugh. (13) Let's all give the Golden Rule a thorough try. Then after we have done our part and it is apparent we have failed—it is then time to rid ourselves of the worker who does not want to be treated kindly.

Gentlemen, we are following the Golden Rule in our safety program. We have found that happy employees work far more safely than unhappy employees. They turn out a better product, make less mistakes and go home after work with little or no sign of fatigue. Their low percentage of absenteeism is remarkable. And, in every measurable degree they far excel the unhappy worker.

It this is true, and we are convinced it is true, it simply means safety is necessary to efficient operation. We should attain all of the production goals we desire. All of our production problems could be eliminated. And at the same time we can have the safe plant—the goal we are trying so hard to reach.

A well organized, intelligent Safety Committee—meeting regularly. And, one interested in the safety and personal welfare of themselves and their co-workers. And, backed to the hilt by Management, will

work wonders in your safety program.

### **New Safety Records At Three AAC Plants**

New safety records were reported in January at three plants of The American Agricultural Chemical Co.

The Spartanburg, S. C. plant has had no lost time injuries for the fourth year in a row. Plants at Savannah, Ga., and North Weymouth, Mass., have each completed one year with no lost time injuries.

## **SAFETY CONFERENCE, MARCH 4-5 TO HEAR FIRST AID SPEAKER**

The Fertilizer Section of the Southern Safety Conference will meet March 4-5 at the Hotel John Marshall, Richmond, Va., under the chairmanship of Quentin S. Lee, Cotton Producers Assn., Atlanta, Ga. Guest panellist will be Mrs. Ann Tuberville, who is personnel director and director of safety for the Florence Manufacturing Company, Florence, S. C. A graduate nurse, formerly employed by the South Carolina State Bureau of Health and the Health Department of Florence, she will discuss "First Aid in a Manufacturing Plant."

### **Phosphate Transfer Station Planned**

West Kentucky Coal Co. and River and Gulf Transfer Co. have jointly announced the construction of a four million dollar river transfer station, to be located near Wood Park, La. Designed to handle more than two million annual tons, the facility will transfer coal from Mississippi River barges to ocean vessels, and phosphates from vessels to the barges.



**ANN TUBERVILLE**

## **CORONET MINE COMPLETES FULL YEAR WITHOUT LOST TIME ACCIDENT**

The Tenoroc Mine of the Coronet Phosphate Company, a division of Smith-Douglass, has set a new record by completing the year 1956 without a single lost-time accident. The Tenoroc Mine, located east of Lakeland, Florida, operates three large draglines, a washer and flotation plant, a drying plant, and grinding plant. All of Coronet's phosphate rock output is mined and shipped from this location. The last lost-time accident occurred March 18, 1954. Since that time 1,156,000 man hours have been worked without a disabling injury.

These operations are hazardous, but the employees at this mine have put into practice a conscientious safety program, which has resulted in this new record. Gaither Newnam, Safety Director, attributes much of their success in safety to

their good housekeeping practices. This means the workmen have kept their plants and grounds in good repair and free of hazards. The employees have also demonstrated their enthusiasm for and desire to carry out a good safety program by instructing new employees in ways of working safely.

In recognition of their safety record of two years without a lost-time accident, the men of the Tenoroc Mine and their families were given a barbecue supper in October, at which Sid Rydell, president of Coronet, was present. For the year 1955 the National Safety Council awarded this mine a plaque in recognition of its accomplishments in the field of mine safety.

The Defluorinating Operation, Research Department and General Offices of Coronet are located at Coronet, near Plant City, Florida.



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**LION AMMONIUM NITRATE**

## You save money with LION in your fields

**LION BRAND AMMONIUM NITRATE IS A LOW-COST SOLID NITROGEN FERTILIZER**

**FOR LOW-COST NITROGEN,** LION is the brand. Lion Ammonium Nitrate is guaranteed to contain 33.5% nitrogen, which means lower-cost nitrogen for your crops . . . more for your money in bigger crop yields.

**FOR MORE PRODUCTION,** Lion Ammonium Nitrate contains TWO kinds of plant nitrogen. *Quick-acting* nitrate nitrogen that gets crops started fast . . . and *long-lasting* ammonia nitrogen that resists leaching and feeds your crops steadily during the important growing months that follow.

**FOR EASIER SPREADING,** Lion Ammonium Nitrate is in pellet form. These

pellets are specially coated to withstand caking . . . then packed in specially lined, moisture-resistant bags. Here's double assurance Lion brand will flow freely, spread evenly after shipment or storage.

**MADE BY WORLD'S LARGEST.** Lion Brand Ammonium Nitrate is made by Monsanto Chemical Company, world's largest producer of prilled ammonium nitrate—and *your* most reliable source of *low-cost* nitrogen. Save money. Buy *Lion!*

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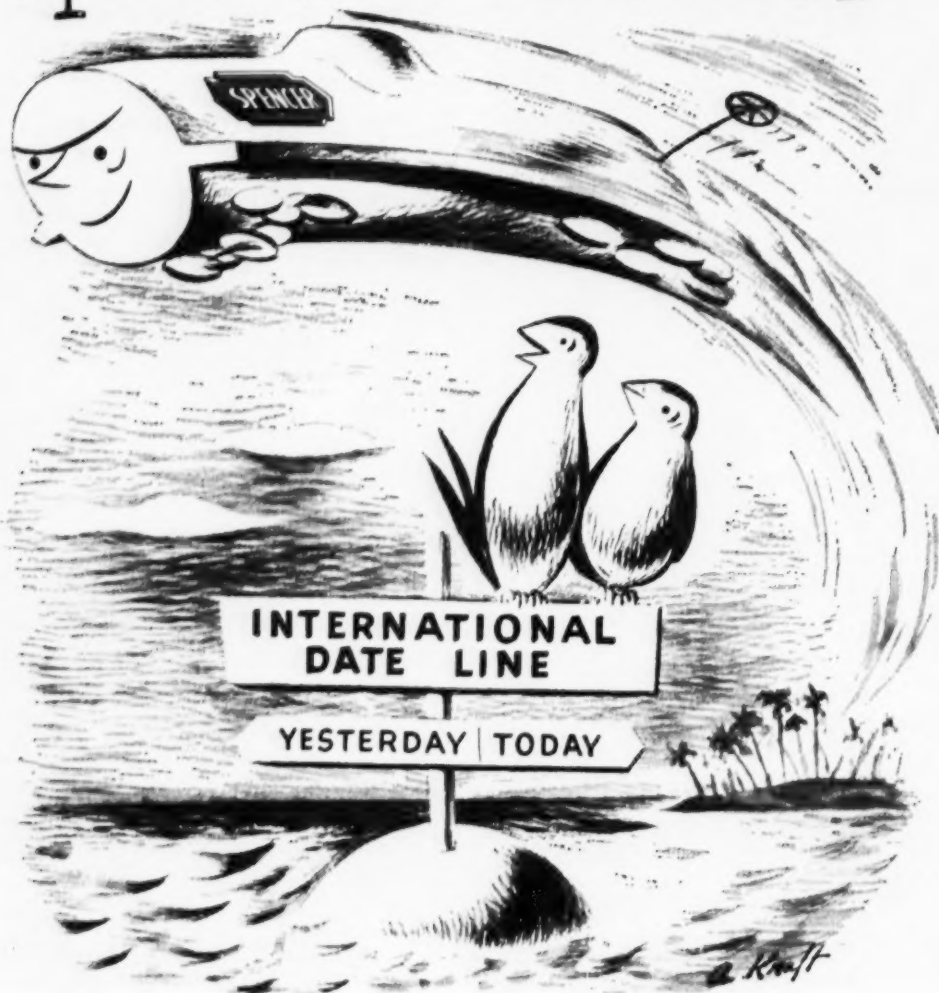
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## APPLETON ELECTED TO HEAD GEORGIA PLANT FOOD SOCIETY

The nearly-completed Center for Continuing Education on the University of Georgia's campus at Athens was the site of Georgia Plant Food Educational Society's annual meeting January 15. The organization elected a new slate of officers, heard an excellent group of speakers; most of the 300-plus members who were on hand remained overnight to attend the meeting on the following day of the Georgia Section, American Society of Agronomy.

W. H. "Buck" Appleton (Potash Co. of America, Atlanta) became the new Ga. PFES president, and J. Fielding Reed (American Potash Institute, Atlanta) was coaxed into retaining his perennial position as Secretary-Treasurer for another term. Retiring President J. Elam Nunnally (Cotton Producers Assn., Atlanta) became director-at-large for the state.

In accordance with a recent change in the organization's by-laws, three new directors were selected from the College of Agriculture staff at Athens: C. C. Murray, dean and co-ordinator; George H. King, director of Experiment Stations; and W. A. Sutton, director of Agricultural Extension.

Northeast District officers for the new term are: Vice President—Malcolm Rowe (Rowe Warehouse and Fertilizer Co., Athens). Directors—C. R. Mason (Mason Gin & Fertilizer Co., Madison), Charles Frederick (F. S. Royster Guano Co., Athens), and Steve Reynolds (Tennessee Seed Corp., Commerce).

Northwest District: Vice President—W. J. Cook, A. D. Adair & McCarty Bros., Atlanta; Directors—W. L. Baughcum (International Minerals & Chemical Corp., East Point), Henry Mauldin (Mauldin Feed & Seed Co., Calhoun), and Julian Reames (Armour Fertilizer Works, Atlanta).

Southeast District: Vice President—John L. Cope (Reliance Fertilizer Co., Savannah); Directors—George Brantley (Blackshear Mfg. Co., Blackshear), R. E. Cole (Cole Fertilizer Co., Hazelhurst), and O. A. Wolfe (Roche Mfg. Co., Dublin).

Southwest District: Vice President—G. L. Dozier (Cotton States Fertilizer Co., Macon); Directors—John I. Allman (Southern Cotton Oil Co., Macon); R. L. Hadden (Farmers Mutual Exchange, Moultrie), and J. P.

Champion, Jr. (Albany Warehouse Co., Albany).

The opening session heard C. C. Murray, dean and co-ordinator for the College, describe a comprehensive coordinated plan—which included liberal boosts in fertilizer application—for increasing farm income in the state.

Russell Coleman, executive vice president of National Plant Food Institute, discussed the industry's responsibility in aiding Georgia's farmers to attain greater net farm income. Color slides using corn ears as bar graphs emphasized that portion of the crop that represents profits as contrasted with that part representing production cost; pictures showed comparisons of current practices versus recommended practices.

The latter part of the afternoon meeting was devoted to a panel on "Contributions That Ga. PFES Members Can Make to the Coordinated Plan." J. W. Fanning, head of Agricultural Economics Dept. at the College was moderator. Ralph Johnson, extension agronomist and project leader, outlined "Present Benchmark, Five-Year Objective, and Ob-

jectives for 1957." T. H. Rogers, head of the Agronomy Department, talked on "Research." Jim Bergeaux described the potential of "Contests, Demonstrations, Short Courses, Schools, Meetings." "Advertising and Publicity" were the topics of Clarence Walker of Coca-Cola Company's Industry Relations Dept. and Ralph Wehunt, extension agronomist. An open discussion period followed the panel forum.

The annual banquet was held that evening in the new dining hall at the Center. The Society presented a lifetime honorary membership plaque to Extension Agronomist Ralph Johnson for his service to the state's agriculture and to the Society. Featured speaker after dinner was Monroe M. Kimbrell, president of Georgia Bankers Assn. and an active worker in agricultural banking circles on the national scene. He was introduced by O. C. Aderhold, president of the University.

Mr. Kimbrell pointed out that the long-heralded "small farmer" has become more a sociological and political emblem than an actual person today. The average investment for each of Georgia's 165,000 farms stands at about \$17,000 now, he said, and an estimated 8% of the state's gross farm income went into fertilizer purchases in 1956.

## CFA SOIL IMPROVEMENT GROUP PLANS APRIL 15 CONFERENCE

A comprehensive work program for 1957 was outlined by the Soil Improvement Committee, California Fertilizer Association, at its first meeting of the year, held in Los Angeles on January 10. Committee Chairman is Millard E. McCollam, Western Manager of American Potash Institute, Inc., San Jose. Vice Chairman for Southern California is R. L. Luckhardt, Brea Chemicals, Inc., Los Angeles. Northern California Vice Chairman is Earl R. Mog, Growers Fertilizer Company, Stockton.

McCollam has appointed the following working sub-committees:

California Fertilizer Conference and Joint Industry, University Meetings, J. H. Nelson, Stockton, Chairman. Vocational Agriculture, Forrest Fullmer, Newport Beach, Chairman. Western Fertilizer Handbook, Earle J. Shaw, Los Angeles, Chairman. Research Grants and Special Funds for the University, Russell White, San Francisco, Chairman. Securing an Agronomist for the Committee Staff, Dr. Malcolm McVickar, Rich-

mond, Chairman. Audio-Visual Selling Aids, R. L. Luckhardt, Los Angeles, Chairman. Workshop Series, R. L. Luckhardt, Chairman. Fertilizer Guarantee Changes, Douglas Jamison, Spokane, Washington, Chairman.

An important 1957 program will be the Fifth Annual California Fertilizer Conference.

Other projects will include the preparation of an illustrated range fertilization booklet for salesmen; an illustrated brochure on fertilizer application equipment and methods; workshops for training of fertilizer salesmen and dealers; the annual fertilizer essay contest among regular students of vocational agriculture in California's junior colleges; securing and establishing within the Committee framework of a qualified agronomist; four \$100 scholarship awards to deserving soils and crops students of California State Polytechnic College; and continuing close collaboration with scientists of the University of California with reference to fertilizer research.



You name the row crop—and you'll find that it grows better, produces more, brings higher prices, when it is supplied with plenty of available Potash.

Nature can go only so far in providing vitally needed Potash. Fast-growing, high-producing crops can easily exhaust the available soil supply—and then it's up to you. That's why it's good business to be sure your fertilizer program includes plenty of POTASH—either in your mixed fertilizers or as a supplemental application.

*American Potash & Chemical Corporation is a basic supplier of Potash. Consult your fertilizer dealer today and be sure to specify plenty of TRONA® POTASH, the vitally needed plant food.*

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The estimated consumption of commercial fertilizers in the United States and Territories (Hawaii and Puerto Rico) during the year ended June 30, 1956, was 22,096,000 short tons (Table 1). This was a decrease of 2.8 percent (628,000 tons) from the quantity used in 1954-55. Consumption of mixed fertilizers amounted to 14,749,000 tons—a decrease of 3.9 percent (599,000 tons)—and of materials for direct application 7,347,000 tons—a decrease of 0.4 percent (29,000 tons). Included in the materials for direct application is 6,568,000 tons of products containing one or more of the primary plant nutrients (N, available  $P_2O_5$ ,  $K_2O$ ) and 779,000 tons of secondary and trace nutrient materials. The tonnage of secondary and trace nutrient materials, of which approximately 85 percent was consumed in the Pacific region, was practically the same as that in 1954-55.

There was a decrease in the total fertilizer consumption in seven of the nine regions of the continental United States and in the Territories. Slight gains occurred in the West South Central and Pacific regions. Approximately 79 percent of the decrease in total fertilizer consumption occurred in the Middle Atlantic, South Atlantic and West North Central regions where nearly 45 percent of the tonnage of all fertilizers was used. These three regions also accounted for most of the respective decreases in mixed fertilizers and materials.

Among the individual areas, the East North Central region showed the largest decrease in mixed fertilizers (152,000 tons), but this was largely offset by the increase in use of materials (132,000 tons). In only the Mountain and Pacific regions was there an increase in the use of mixed fertilizers. However, the mixtures used in these two regions comprised less than 15 percent of the tonnage of all fertilizers used therein and less than 3 percent of the total consumption of mixtures in the United States. The consumption of fertilizer materials for direct application showed increases in only three regions—East North Central (13.3 percent), West South Central (1.1 percent), and Pacific (0.5 percent).

Of the various classes of materials used for direct application an increase in consumption was shown only by the phosphate products (Table 2). Among such products the greatest increase (nearly 55 percent) was in phosphate rock, chiefly in the East North Central and West

## Preliminary report:

# Consumption of Commercial Fertilizers and Primary Plant Nutrients in the United States, year ended June 30, 1956

WALTER SCHOLL, ESTHER I. FOX, HILDA M. WALLACE, and FLORENCE CRAMMATTE

Fertilizer and Agricultural Lime Section

Soil and Water Conservation Research Branch

Agricultural Research Service

U. S. Department of Agriculture

Beltsville, Maryland

North Central regions where it is mostly used. The consumption of normal superphosphate appears to have decreased about 15 percent, while the other two principal phosphate materials—concentrated superphosphate and the ammonium phosphates (11-48, 13-39, 16-20)—showed little change from their use in 1954-55.

The consumption of anhydrous ammonia for direct application is estimated to have totaled 431,000 tons, an increase of 21.8 percent over the use in 1954-55 (Table 3).

The increases, occurring in all regions, were greatest for the East South Central, West South Central, and Mountain regions where they were approximately 40 percent in each area. The use of aqua ammonia increased 30.2 percent, but the consumption of nitrogen solutions was nearly the same as in 1954-55.

## Primary Plant Nutrients

The estimated quantity of primary plant nutrients contained in all fertilizers consumed in the United States and Territories was 6,081,000 tons (Table 4). This was 39,000 tons

Table 1. Estimated Fertilizer Consumption in United States, Year Ended June 30, 1956, with Comparisons

REGION	Consumption <sup>1</sup>			Change from 1954-55		
	Mixtures	Materials <sup>2</sup>	Total	Mixtures	Materials	Total
	1,000 tons	1,000 tons	1,000 tons	Percent	Percent	Percent
New England <sup>3</sup>	353	70	423	-3.4	-6.4	-3.9
Middle Atlantic <sup>4</sup>	1,775	205	1,980	-6.5	-11.0	-7.0
South Atlantic <sup>5</sup>	4,787	1,090	5,877	-2.9	-5.4	-3.3
East North Central <sup>6</sup>	3,369	1,128	4,497	-4.3	+13.3	-0.4
West North Central <sup>7</sup>	1,177	865	2,042	-8.4	-3.9	-6.5
East South Central <sup>8</sup>	1,972	914	2,886	-2.0	-1.0	-1.7
West South Central <sup>9</sup>	701	666	1,367	-1.0	+1.1	+ .1 <sup>14</sup>
Mountain <sup>10</sup>	52	342	394	+0.4	-8.5	-7.4
Pacific <sup>11</sup>	314	1,917	2,231	+5.6	+0.5	+1.2
CONTINENTAL U.S.	14,500	7,197	21,697	-3.8	-0.2	-2.6
Territories <sup>12</sup>	249	150	399	-10.8	-6.2	-9.1
TOTAL: 1955-56	14,749	7,347 <sup>13</sup>	22,096	-3.9	-0.4	-2.8
1954-55	15,348	7,375 <sup>13</sup>	22,723	0.0	0.0	0.0
1953-54	15,541	7,232 <sup>13</sup>	22,773	+1.3	-1.9	+0.2

<sup>1</sup>Includes fertilizers distributed by Government Agencies. <sup>2</sup>Includes: Ground phosphate rock and colloidal phosphate, basic slag, secondary and trace element materials, such as borax, metallic salts, sulfur, gypsum, etc., used as separate materials. Does not include liming materials or the quantity of materials used for manufacture of commercial mixtures. <sup>3</sup>Maine, N. H., Vt., Mass., B. I., Conn. <sup>4</sup>N. Y., N. J., Pa., Del., D. C., Md., W. Va. <sup>5</sup>Va., N. C., S. C., Ga., Fla. <sup>6</sup>Ohio, Ind., Ill., Mich., Wis. <sup>7</sup>Minn., Iowa, Mo., N. D., S. D., Neb., Kan. <sup>8</sup>Ky., Tenn., Ala., Miss. <sup>9</sup>Ark., La., Okla., Tex. <sup>10</sup>Mont., Idaho, Wyo., Colo., N. Mex., Ariz., Utah, Nev. <sup>11</sup>Wash., Oregon, Calif. <sup>12</sup>Hawaii, F.R. <sup>13</sup>Materials not guaranteed to contain N,  $P_2O_5$ , or  $K_2O$  included in 1955-56 total, 779,000 tons; 780,308 tons in 1954-55; 615,513 tons in 1953-54. <sup>14</sup>Less than 0.05 percent.

**Table 2. Estimated Consumption of Classes of Materials for Direct Application in the United States and Territories, Year Ended June 30, 1956, with Comparisons**

CLASS	Year Ended June 30,		Change from
	1955	1956	1954-55
	1,000 tons	1,000 tons	Percent
Chemical nitrogen materials	3,500	3,262	- 6.8
Natural organics	461	444	- 3.6
Phosphates	2,233	2,469	+10.6
Potash materials	401	393	- 2.1
Secondary and trace nutrient materials	780	779	- 0.2
<b>TOTAL</b>	<b>7,375</b>	<b>7,347</b>	<b>- 0.4</b>

**Table 3. Estimated Consumption of Kinds of Chemical Nitrogen Products for Direct Application in the United States and Territories, Year Ended June 30, 1956, with Comparisons**

PRODUCT	Year Ended June 30		Change from
	1955	1956	1954-55
	1,000 tons	1,000 tons	Percent
Ammonia, anhydrous	354	431	+21.8
Ammonia, aqua	232	302	+30.2
Ammonium nitrate	1,115	930	-16.6
Ammonium nitrate—Limestone mixtures	358	307	-14.3
Ammonium sulfate	520	411	-20.9
Calcium cyanamide	69	65	- 5.3
Calcium nitrate	56	61	+ 8.8
Nitrogen solutions	109	108	- 0.6
Sodium nitrate	616	547	-11.2
Urea	68	92	+33.4
Other	3	8	-----
<b>TOTAL</b>	<b>3,500</b>	<b>3,262</b>	<b>- 6.8</b>

(0.6 percent) less than in 1954-55. The total for 1955-56 comprised 1,952,000 tons of nitrogen, 2,240,000 tons of available  $P_2O_5$ , and 1,889,000 tons of  $K_2O$ . These quantities represent decreases of 9,000 tons (0.4 percent) for nitrogen and 44,000 tons (2.0 percent) for available  $P_2O_5$

and an increase of 14,000 tons (0.8 percent) for  $K_2O$  from the respective consumptions in 1954-55.

Increases in the consumption of total primary nutrients, shown in five of the ten regions, were proportionately the greatest in the West South Central (7.4 percent) and

Pacific (5.7 percent) areas. The largest decreases were in the West Central (8.0 percent) and Middle Atlantic (5.9 percent) regions and the Territories (7.3 percent). The use of nitrogen and  $P_2O_5$  increased in five regions, and  $K_2O$  consumption increased in six regions. With the exception of  $K_2O$ , however, these increases did not offset fully the decreases that occurred in the other regions.

The consumption of primary plant nutrients supplied by mixed fertilizers is estimated to have been 4,275,000 tons, comprising 815,000 tons of nitrogen, 1,789,000 tons of available  $P_2O_5$  and 1,671,000 tons of  $K_2O$ . These quantities represent 12,000 tons (1.5 percent) more nitrogen, 32,000 tons (1.8 percent) less available  $P_2O_5$ , and 13,000 tons (0.8 percent) more  $K_2O$  than those in 1954-55. Materials used for direct application supplied 1,137,000 tons of nitrogen, 451,000 tons of available  $P_2O_5$ , and 218,000 tons of  $K_2O$ , representing decreases of 21,000 tons (1.8 percent) for nitrogen and 12,000 tons (2.7 percent) for available  $P_2O_5$  and an increase of 1,000 tons (0.6 percent) for  $K_2O$  as compared with 1954-55.

Total primary nutrients in all mixed fertilizers consumed in the United States and Territories averaged 29.0 percent, as compared with 27.90 percent in 1954-55. For all direct-application materials that supplied primary nutrients the corresponding averages were 27.5 and 27.86 percent.

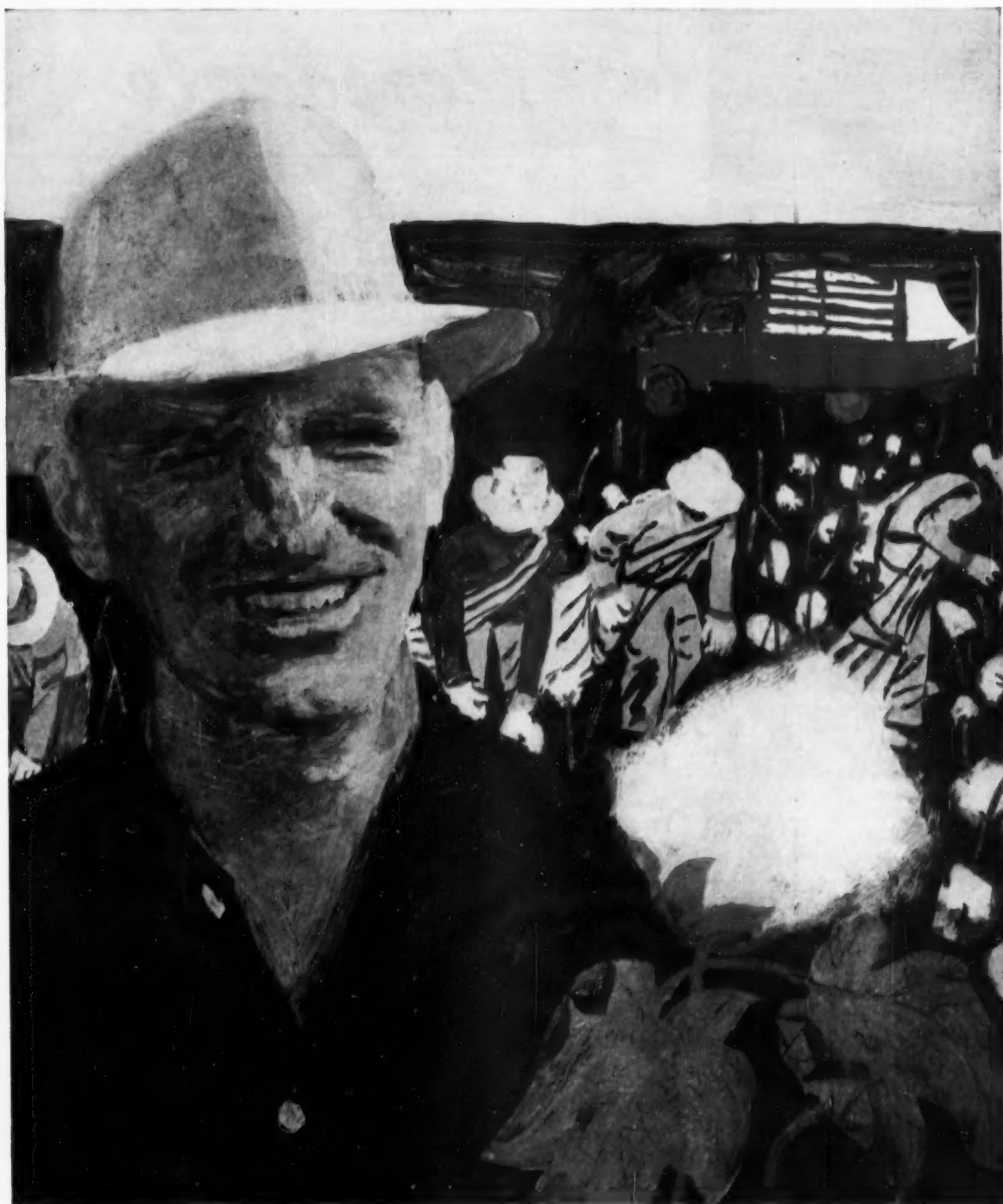
**Table 4. Estimated Content of Primary Plant Nutrients in All Fertilizers Consumed in United States, Year Ended June 30, 1956, with Comparisons.**

REGION <sup>1</sup>	Quantity				Change from 1954-55			
	N	Available $P_2O_5$ <sup>2</sup>	$K_2O$	Total	N	Available $P_2O_5$	$K_2O$	Total
	1,000 tons	1,000 tons	1,000 tons	1,000 tons	Percent	Percent	Percent	Percent
New England	28	48	44	120	+ 3.3	+ 0.2	- 3.0	-0.3
Middle Atlantic	120	219	188	527	- 0.9	- 8.9	- 5.2	-5.9
South Atlantic	387	464	494	1,345	- 2.7	- 2.7	+ 1.2	-1.3
East North Central	270	596	594	1,460	+ 1.4	+ 3.5	- 1.7	+1.0
West North Central	241	314	180	735	-14.0	-11.6	+ 9.8	-8.0
East South Central	282	254	225	761	+ 4.0	- 1.4	+ 3.4	+2.0
West South Central	214	160	87	461	+10.9	+ 4.2	+ 4.9	+7.4
Mountain	75	63	3	141	- 1.1	+ 4.9	+16.2	+1.8
Pacific	278	103	35	416	+ 4.8	+ 5.9	+13.3	+5.7
CONTINENTAL U.S.	1,895	2,221	1,850	5,966	- 0.1	- 1.9	+ 0.9	-0.5
Territories	57	19	39	115	- 9.1	- 8.0	- 4.1	-7.3
<b>TOTAL: 1955-56</b>	<b>1,952</b>	<b>2,240</b>	<b>1,889</b>	<b>6,081</b>	<b>- 0.4</b>	<b>- 2.0</b>	<b>+ 0.8</b>	<b>-0.6</b>
1954-55	1,961	2,284	1,875	6,120	0.0	0.0	0.0	0.0
1953-54	1,847	2,235	1,814	5,896	- 5.8	- 2.2	- 3.3	-3.7

<sup>1</sup>The States comprising the regions are listed in footnotes of Table 1.

<sup>2</sup>Includes, as available  $P_2O_5$ , 2 percent of the colloidal phosphate and 3 percent of the phosphate rock marketed for direct application.





**POTASH RAISES FARM INCOME.** The successful American cotton grower. He's learned the evils of weevils and beaten 'em with the best modern dusts and sprays. He takes good care of his soil, too. Every year he uses well-balanced fertilizers to replenish the potash in his soil—and every year he comes up with the biggest, healthiest cotton crop around. He has no more luck than his neighbors. Just more foresight.

USP's Higrade muriate of potash is free-flowing and non-caking and has the highest  $K_2O$  content—62-63%  $K_2O$ . USP's Granular muriate of potash is also available and contains a minimum of 60%  $K_2O$ .

#### UNITED STATES POTASH COMPANY

DIVISION OF UNITED STATES BORAX & CHEMICAL CORPORATION  
30 Rockefeller Plaza, New York 20, New York. Southern Sales  
Office: Rhodes-Haverty Building, Atlanta, Georgia.



REG. U. S. PAT. OFF.



The Potash Company of America has announced the appointment of Harry Carroll as sales representative for Texas, Louisiana, Mississippi and portions of Arkansas and Alabama. He succeeds Shelton Appleton, who has been transferred to PCA's Midwestern territory. W. H. Appleton, the company's Southern Sales Manager, located in Atlanta, Georgia, will work closely with Mr. Carroll.



Bradley & Baker has named A. L. Wigger as a field salesman to be based in their St. Louis Office. Mr. Wigger was formerly associated with Olin-Mathieson Chemical Corp. and the agricultural chemicals division of Pittsburgh Coke and Chemical Co.



E. G. Muir, sales manager for the Omaha sales division of Bemis Bro. Bag Company, has been named to head a newly designated sales development section of the company's general sales department in St. Louis. Announcement was made by H. V. Howes, vice president and director of sales, to whom Mr. Muir will report. Mr. Muir joined the Bemis organization in 1949.

# Personals

At the 98th Maine State Legislature's organizational meeting on January 1, **James C. Totman**, vice president of **Northern Chemical Industries** and manager of **Summers Fertilizer Company's** Bangor office, was elected majority floor leader of the House of Representatives. He is commencing his fourth two-year term as State Representative from the City of Bangor.

During the past year, Jim has been active on the Highway Safety Committee with frequent radio and television talks. Maine was one of the three states in the Union that had no highway fatalities during the past holiday season and this record is attributed in part to his intensive efforts.

**Maj. Gen. Ralph H. Wooten**, president of the **Agricultural Ammonia Institute** during 1956, has retired from **Mid-South Chemical Corporation** and will continue as a consultant to the agricultural chemical concern, according to an announcement by **Ellis T. Woolfolk**, president.

As one of the founders and first executive vice president of **Mid-South Chemical Company, Inc.**, predecessor of **Mid-South Chemical Corp.**, General Wooten helped develop an anhydrous ammonia marketing organization that has grown to include operations throughout the Central United States and in Texas.

At the same time, General Wooten was one of the founding members, first treasurer and later presi-

dent of the **Agricultural Ammonia Institute**, national trade association of the industry, which now has members in more than 40 states and several foreign countries. He will continue as a member of its Executive Committee.

**H. J. Baker & Bro.**, 600 Fifth Avenue, New York, announce the retirement of **William H. English, Jr.**, as a partner as of December 31, 1956. The firm will continue under the same trade style.

The **American Potash Institute** has announced the appointment of **Stanford Martin, Jr.**, as head of publications and director of publicity. He comes to the Institute from North Carolina State College where he was publications editor for the development program of the college.

**R. H. (Bob) Fisackerly** has been elevated to the position of general sales manager for **Mississippi Chemical Corporation**, Yazoo City, Mississippi, made vacant by the recent death of **Ward F. Seal**, according to an announcement by **Owen Cooper**, executive vice president. Mr. Fisackerly assumed his new duties January 1, 1957.

**Oscar E. Clary** has been transferred from managership of the Richmond plant of **Diamond Black Leaf** to the same post at the Louisville plant.



Perry G. Onstot, who has been appointed agronomist and sales promotion manager for the Mixed Fertilizer Division of **Davison Chemical Company**, Division of **W. R. Grace & Co.**, and transferred from the branch office at Joplin, Mo., to the Baltimore headquarters.



Arthur M. Mohler who has been appointed manager of the fertilizer division of **Chase & Company**, Sanford, Fla. Former vice president of **Lebanon Chemical Corporation**, Lebanon, Pa., he has 20 years of experience in production, sales and application of agricultural and garden supply chemicals and fertilizers.

**Edward R. Adams**, assistant treasurer of **Virginia-Carolina** has been made head of their operations analysis program, which covers all control functions, operations planning, budgets, standards, reports and problem analyses.

**Harold A. LeSieur, Jr.**, has been installed as president of the Industrial Management Club of Honolulu. He is administrative assistant to the president of **Pacific Chemical & Fertilizer**.

**A. Nelson Myers** has been made sales manager of **Texas Gulf Sulphur**, succeeding **Holland R. Wemple**, who has relinquished those duties, but continues as vice-president.

**Morgan L. Smith** has resigned as vice-president of Augusta's First National Bank to become vice-president and treasurer of **Inglett & Co.** He has been a director for several years.

**C. J. Knowles** has been elected to the board of **Foremost Fertilizer**, Leesburg, Florida, succeeding his late father who had served on the board since the founding of the concern in 1946.

**Southern States Phosphate & Fertilizer**, Savannah, Georgia, in line with its policy of promoting young executives to positions of responsibility has made vice-president of Jack Dana Lee, in charge of manufacturing; Charles B. Compton in charge of sales. Both have been with the company for a number of years.

**Charles Cervone** has been made

general salesmanager of **Diamond Fertilizer**, Sandusky, Ohio.

**Harold Ross McLarty**, discoverer of boron deficiency in fruit trees of the **Okanagan**, and responsible for boosting production in that area by a million annual boxes, retired recently as chief of the plant pathology laboratory of the **Canada Department of Agriculture**.

**Dr. Clyde Williams**, president of **Battelle Memorial Institute**, Columbus, Ohio, has announced that the Board of Trustees has appointed **Dr. B. D. Thomas** as the Institute's new director.

**National Potash Company** announces the transfer of **William C. Boswell** from the southwestern territory to their Montgomery, Alabama office, 212 Bell building, Montgomery, Alabama. Mr. Boswell will work the states of Georgia and Mississippi under the supervision of **Fred C. Broadway**. **William P. Brashear** has been made sales representative in the states of Texas, Louisiana, Oklahoma and Arkansas, and will make his headquarters in Shreveport, Louisiana.

**A. D. Adair, Jr.**, formerly with **A. D. Adair & McCarty Bros.**, Atlanta, has moved with his family to Caracas, Venezuela, where he is general manager for Latin American Div., **Dixie Products, Inc.** of Cleveland, Tenn.

**William J. Cook**, formerly with **Royster Guano**, Athens, Ga., succeeds him as vice president and general manager at **Adair & McCarty**.



In his new position as Director of Agronomy for Southern Nitrogen Company, Inc., Dr. Irvin M. Wofford will work closely with the agricultural research and extension leaders of the Southeast. He is particularly well fitted by training and experience to be of real service in promoting the more efficient use of plant nutrients through research and extension programs.



**Frank McGrane**, above, was appointed head of a new sales section of **American Potash & Chemical Corp.** which will handle fertilizer, fumigant and insecticide products manufactured at the company's Los Angeles and Trona plants.

**Al Swain**, long-time manager of agricultural chemical sales for the Los Angeles plant, becomes a company consultant; **W. E. Horn**, California and Arizona district sales manager, and **Ellis C. Kent**, Southern California sales representative, will continue in their respective districts and will handle the expanded line of products in these areas.



Sale of Chase Bag Company products in northern Illinois will now be handled by **C. E. McCabe**, sales representative for Chase since 1947. Announcement of the new assignment was made jointly by **W. N. Brock**, vice president and general sales manager, and **D. R. Munro**, sales manager of the firm's Milwaukee branch.



**Lawrence C. Byck, Jr.**, named manager of heavy chemical sales for U. S. Industrial Chemicals Co., Division of National Distillers Products Corporation, it has been announced by **A. R. Ludlow, Jr.**, U.S.I.'s Director of Sales. Mr. Byck will have responsibility for sales of heavy chemicals, including nitrogen products, phosphoric acid and sulfuric acid.



**James N. Hinyard** has been appointed director of market development for **American Potash & Chemical Corporation**, according to an announcement by **Daniel S. Dinsmoor**, AP&CC vice president in charge of planning and development. He replaces **Dr. A. J. Dirksen** who recently was named general sales manager of the company's Industrial Chemicals Division.

# CHANGES

BONE  
LASSITER  
DANIELS  
ROTH  
SEYMOUR  
MCNEILL  
REDDING



A technical service group, including specialists in all phases of operation of fertilizer plants, has been formed as a part of the sales organization for agricultural chemicals in **Monsanto Chemical Company's** inorganic chemicals division, it was announced by **Tom K. Smith, Jr.**, divisional director of marketing.

Mr. Smith also named seven individuals to the new group, including **William R. Bone** of St. Louis, as manager.

Those in the new group include two former fertilizer plant managers and two research specialists in the field. In the group in addition to Mr. Bone are **Robert W. Lassiter** of El Dorado, Ark.; **S. D. Daniels** of St. Louis; **Dr. Edwin Roth** of Anaheim, Calif.; **James M. Seymour** of Collinsville, Ill.; **J. Howard McNeill** and **Nicholas L. Redding** of St. Louis.

Working closely with the new technical service organization will be four different research groups which previously were established under the direction of **Dr. Marion D. Barnes** of St. Louis, assistant research director.

These research groups, to be consolidated in the division's new research headquarters at St. Louis next May, will be concerned with

basic knowledge of the products sold as fertilizer raw materials, with plant and animal nutrition, with special work in fertilizer analysis and with plant food processing data for customers manufacturing fertilizers.

The district sales office for agricultural chemicals of **Monsanto Chemical Company's** inorganic chemicals division, which has been located at Des Moines, Iowa, was transferred to St. Louis effective January 1.

**G. C. Kempson** and **W. O. Butler**, manager and assistant manager respectively for the office, are located at 800 N. Twelfth Boulevard with other Monsanto district sales offices.

The office, which has been in the Insurance Exchange Building at Des Moines since last May, was moved to bring the organization more in line with existing Monsanto sales territories for other products. The agricultural chemicals group of the inorganic division principally handles raw materials used by the fertilizer industry.

**William B. Poterfield**, vice president and sales manager of **National Potash Company** announces the opening of their Southern Sales Office at 212 Bell Building, Montgomery, Ala-

bama. Telephone: Amherst 5-8234. **Fred C. Broadway** has been appointed manager.

**Calvin L. Dickinson**, director of manufacturing at **American Potash & Chemical Corporation's** main plant at Trona, Calif., recently announced organizational changes affecting top supervisory personnel at the Trona plant's engineering department.

Included in the shift are **Myron W. Colony**, formerly chief engineer; **James Jensen** formerly assistant chief engineer; **Howard Barker**, formerly plant engineering head; **W. C. Henderson**, formerly general foreman of maintenance and construction, and **A. L. Cartter**, foreman of maintenance and construction.

Under the change, Mr. Colony has assumed responsibilities of advisory engineer to aid in long-range engineering planning and coordinate basic planning on major projects.

Mr. Jensen has been appointed manager, plant engineering, while Mr. Barker becomes assistant manager, plant engineering.

Mr. Henderson was named plant engineer, while Mr. Cartter succeeds Mr. Henderson as general foreman.



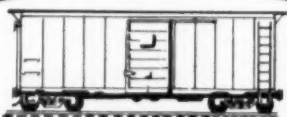
J. H. COUNCE

**Chase Bag Company** expanded the managerial staff of its Southern sales region and New Orleans manufacturing plant on January 1, according to an announcement by **R. N. Connors**, executive vice president.

**J. H. Counce**, Southern regional sales director who has also functioned as manager of the New Orleans branch, will devote all of his time to direction of sales in the Southern region and **D. H. Denholm**, formerly chief industrial engineer for Chase Bag, has been appointed manager of its New Orleans plant at Dorgenois Street and the Industrial Canal.

**Charles S. Wicks**, a member of the staff of the industrial engineer-





### TRIPLE SUPERPHOSPHATE

Phillips 66 Triple Superphosphate contains 46% available phosphoric acid. It has the physical properties essential for maximum ammoniation efficiency.



### AMMONIUM NITRATE

New, improved quality Phillips 66 Prilled Ammonium Nitrate contains 33.5% nitrogen. The small, coated prills resist caking, handle easily. Depend on Phillips 66 Prilled Ammonium Nitrate for top-notch crop response as a direct application material. It's an ideal companion high nitrogen fertilizer for your quality mixed goods.

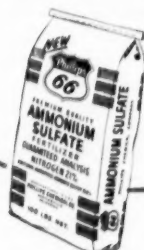


### NITROGEN SOLUTIONS

Get more N per dollar! There are six Phillips 66 Nitrogen solutions for use in preparation of high-analysis fertilizers and the ammoniation of phosphate materials. Use these solutions to help keep manufacturing costs low; help rapid, thorough curing.

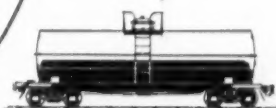
# 5 PHILLIPS

## Materials for the Production of Premium Fertilizers



### AMMONIUM SULFATE

New premium quality Phillips 66 Ammonium Sulfate contains 21% nitrogen, 23.8% sulfur. It is dry-cured to remove excess moisture, prevent caking. Uniform dust-free crystals flow freely, mix easily. Ideal for all analyses of mixed goods and for direct application. Available in bags or bulk.



### ANHYDROUS AMMONIA

Phillips 66 Agricultural Ammonia containing 82% nitrogen is a convenient, economical source of nitrogen for the formulation of mixed fertilizers. Immediate tank car shipments are assured through Phillips production facilities in the Texas Panhandle and at Adams Terminal near Houston. Phillips also has tank car pools at many key points.



## PHILLIPS CHEMICAL COMPANY

A Subsidiary of Phillips Petroleum Company, Bartlesville, Oklahoma

### Offices in:

AMARILLO, TEX.—First Nat'l Bank Bldg.  
ATLANTA, GA.—1428 West Peachtree Street  
BARTLESVILLE, OKLA.—Adams Bldg.  
CHICAGO, ILL.—7 South Dearborn St.  
DENVER, COLO.—1375 Kearney Ave.  
DES MOINES, IOWA—6th Floor, Hubbell Bldg.

HOUSTON, TEX.—1020 E. Holcombe Blvd.  
INDIANAPOLIS, IND.—1112 N. Pennsylvania St.  
KANSAS CITY, MO.—500 West 39th St.  
MINNEAPOLIS, MINN.—212 Sixth St. South  
NEW YORK, N. Y.—80 Broadway  
OMAHA, NEB.—6th Floor, WOW Building  
PASADENA, CALIF.—604 Citizens Bank Bldg.

RALEIGH, N. C.—804 St. Mary's St.  
SALT LAKE CITY, UTAH—68 South Main  
SPOKANE, WASH.—521 East Sprague  
ST. LOUIS, MO.—4251 Lindell Blvd.  
TAMPA, FLA.—3737 Neptune St.  
TULSA, OKLA.—1708 Utica Square  
WICHITA, KAN.—501 KFH Building

ing department with headquarters in St. Louis assumes the position of Senior Industrial Engineer.

Mr. Counce will establish separate sales headquarters for the Chase Bag Company Southern region in downtown New Orleans at the International Trade Mart, Camp and

Common Sts. Also located here will be the firm's New Orleans sales office, **P. E. Nelson**, Mgr., as well as the Chase Bag Export Sales Division, **J. A. Sutherlin**, Mgr., and the Southern sales office of the Chase Paper Bag Division, **G. N. Burns**, Mgr.

# CROP

## CHEMICALS

### Technical Manpower Need Stressed in NAC'S Program

The need for more technically trained men and women to speed progress in agriculture will be highlighted at the Spring meeting of the National Agricultural Chemicals Association in San Francisco, California, March 6, 7 and 8, 1957, Fairmont Hotel.

The program will bring into sharp focus the growing opportunities in all technical phases of agriculture, including in the crop chemicals industry, and the need for encouraging young men and women to train for openings in the industry and in government agencies allied to agriculture.

The program also will probe into the economics of agriculture, with discussions by top leaders on the importance of financing and credit to agricultural progress, and on the outlook for return on investment in the agricultural chemicals industry.

Where growers and industry stand under the Miller Amendment to the Food, Drug and Cosmetic Act will be discussed by representatives of government agencies.

Specific topics on the program are:

Wednesday, March 6—President's Address on the outlook for the agricultural chemicals industry, **Fred W. Hatch**, NAC President and Manager, Agricultural Chemical Division, Shell Chemical Corporation; "Men for Agricultural Progress," **Dr. S. B. Freeborn**, Provost, University of California, Davis, California; "Money for Agricultural Progress," **Earl Coke**, Vice President, Bank of America, and former Assistant Secretary of Agriculture; and "Credit for Agricultural Progress," **J. A. Walker**, General Credit Manager, Standard Oil Company of California.

Thursday, March 7—will be devoted to Association committee

meetings and conferences.

Friday, March 8—**Fred Shanaman**, President, Pennsylvania Salt Manufacturing Company of Washington, speaking on the outlook for return on investment in the agricultural chemicals industry; discussion by representatives of government agencies on where growers and industry stand today under the Miller Amendment; a report on the latest developments in forest pest control; and a graphic presentation of the current work of the NAC Association.

### Weed Control Group Meet in Augusta

Weed control on Southern farms, highways, railroads, ponds, air fields, and even under water were targets of a group of scientists meeting in Augusta, Ga., January 23-25.

The group makes up the Southern Weed Conference, which is composed of leading authorities in the field from land-grant colleges, USDA, agricultural chemical manufacturers, and farmers.

The following general topics were discussed during the three-day meeting. They were grouped into the following sessions: General Aspects of Weed Control; Control of Specific Weeds—Nutgrass, Johnson grass, etc.; Control of Weeds in Specific Crops — Cotton, Corn, Vegetables, etc.; Aquatic Weed Control; Weed Control in Pastures and Turf; Weed Control in Non-Crop Areas—Brush; and New Developments in the field of chemical weed control.

Officers for the Tenth Annual Conference: President, **Dr. W. B. Albert**, S. C. Agricultural Experiment Station, Clemson, S. C.; Vice-President, **Dr. E. G. Rodgers**, University of Florida, Gainesville, Fla.; and Secretary-Treasurer, **Dr. W. K. Porter**, Louisiana State University, Baton Rouge, La. **Dr. J. K. Leasure**,

Dow Chemical Company, Midland, Michigan, served as chairman of the Program Committee for this conference.

### Soybean Quarantine Discussed in D. C.

The American Soybean Association has called attention to a public hearing on a U. S. Department of Agriculture proposal to quarantine the states of Missouri, North Carolina and Tennessee for the soybean cyst nematode that causes "yellow dwarf" disease of soybeans.

The hearing was to be held Jan. 31 in Washington.

The quarantine, if established, will require that all soybeans, both seed and commercial, moving out of quarantined areas be inspected and possibly fumigated, according to the Association. The proposed quarantine will apply to individual soybean plants and soybean hay, also to annual lespedeza and common vetch, which are hosts to the nematode.

### "Brain" Speeds Monsanto Formulating

A farm "hired hand" who, in one hour, could accomplish more than a year and a half's work certainly would have no trouble finding a place to apply such rapid industriousness.

Just such speed and industriousness on behalf of the farmer now is possible with the IBM 702 Electronic Data Processing Machine or "brain" used by Monsanto Chemical Company. The latest job the giant brain has been taught to perform is to work out the lengthy mathematical and chemical problems involved in formulating granular fertilizers.

Under ordinary circumstances at least two hours is required by one man for calculating each formulation. Monsanto's "brain" recently calculated 1,650 such formulations in less than an hour—which figures out to be more than 19 months of work from an engineer with a slide rule, working 40 hours a week. The results worked out by the machine permit granular fertilizer manufacturers to compare various operating conditions, raw materials, and production costs and to select the most efficient combination.

Monsanto's Inorganic Chemicals Division, which produces phosphorus and nitrogen products as raw materials for fertilizer manufacturers, is making the IBM 702 formulation service available to customers through its technical service department.

## A & S Improves Wellsburg Plant Facilities

Arkell & Smiths is bringing to successful completion a modernization and expansion program at their multiwall bag-making plant at Wellsburg, W. Va.

After laying new flooring, the flow of materials and sequence of operations were rearranged to give improved efficiency and increased production. A new paper warehouse was constructed greatly increasing paper storage capacity.

Facilities were further expanded to accommodate new equipment for manufacturing A & S's latest multiwall—the "Step-Flex" stepped-end bag.

## NPFI Invites Entries to Soil Builders Award

Farm magazine editors of the nation have been invited to submit entries for the Fifth Annual National Plant Food Institute's "Soil Builders Award for Editors" contest, the deadline for which is March 15, 1957.

The contest, sponsored by the Institute with the approval of the American Agricultural Editors' Association, is designed to honor editors and their staffs for their 1956 editorial contributions in the important field of building and maintaining soil fertility.

Judges for the "Soil Builders Award for Editors" contest are nationally-known in the field of agriculture. They are:

Robert J. Bishopp, President, National Vocational Agricultural Teachers' Association, Inc., Powell, Wyoming; Roger Fleming, Secretary-Treasurer, American Farm Bureau Federation, Washington, D. C.; Nolen J. Fuqua, President, The National Association of Soil Conserva-

tion Districts, Duncan, Oklahoma; Wesley Hardenbergh, President, American Meat Institute, Chicago, Illinois; R. H. McDougall, President, National Association County Agricultural Agents, Butler, Pennsylvania; and Herschel D. Newsom, Master, The National Grange, Washington, D. C.

## Bulletin on Bag Conveyor Offered by Richardson

A new adjustable-length flat belt bag conveyor designed for package conveying, particularly in line with filling and sewing operations, is de-

scribed and illustrated in a new 4-page, 2-color bulletin, No. 0456, now offered by Richardson Scale Co., Clifton, N. J.

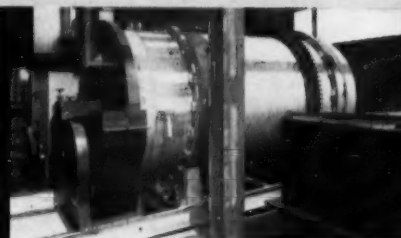
The new bulletin describes installation operation of the conveyor, which coordinates bag packing and sewing into a single one-man operation. A key feature is the conveyor's "telescope" design, which gives the user a choice of conveying lengths from 7' to 12'.

For copies of Bulletin 0456 on Richardson's new flat belt conveyor, write to Richardson Scale Company, Van Houten Avenue, Clifton, N. J.

## ► Ammoniators\* ► Coolers ► Dryers ► Elevators ► Granulators\* ► Conveyors

\*TVA Licensed Manufacturer

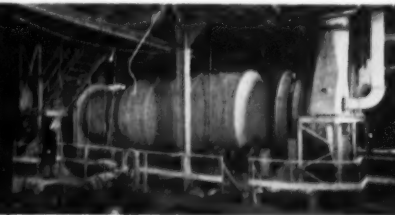
FOR THE  
FERTILIZER  
INDUSTRY



## Renneburg Continuous Combination Ammoniator-Granulator

**SAVES MONEY**—Costs less to buy . . . costs less to operate • **SAVES TIME**—Ammoniation is going on at all times . . . no loss of time in charging or discharging • **SAVES SPACE** • **HIGHER RATE OF AMMONIATION** • **FLEXIBLE**—any retention time can be acquired . . . speed of rotation and bed depth can be easily increased or decreased.

## Renneburg DehydrO-Mat Dryer



Built in a wide range of sizes, the DehydrO-Mat Dryer, though comparable in price, out-performs conventional dryers of similar volume. Compact, it is easy to install in a minimum of space. The varying diameter cylinder regulates air and material velocities . . . controls temperature drop and product retention time . . . assures gentle drying.

**Other chemical and fertilizer processing equipment manufactured by Renneburg includes:** • Ammoniators • Granulators • Dryer Furnaces • Complete Air Handling Systems • Pilot Plants • DehydrO-Mat Combination Dryers and Coolers

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## Edw. Renneburg & Sons Co.

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## OBITUARIES

**T. R. "Uncle Bud" Anderson**, 91, longtime fertilizer man of Duncan, S. C., died after a 2-month illness December 23.

**O. O. Banton**, Southern division superintendent for Royster, and with them since 1917, died after a brief illness December 7, in Norfolk.

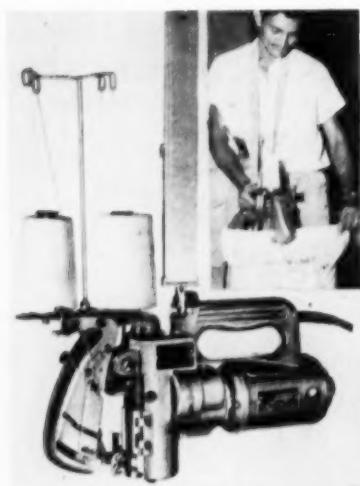
**Edward Dudley**, for 14 years with Canada Packers, for whom he headed the Analysis department at his death, passed away December 3.

**Arthur E. Hecker**, 65, retired American Cyanamid executive, died in New Rochelle, N. Y., of injuries due to a fall.

## Union Special Machine Announces New Electric Fertilizer Bag Closer

Union Special Machine Company, Chicago manufacturer of industrial sewing machines, announces an entirely new addition to its line of bag closing machines.

A portable electric bag closer, designated as Class 2100, has just been perfected by the company and is in production now. Extensive research and testing have gone into the development of this machine to make it the most efficient, and versatile, unit of its type on the market today.



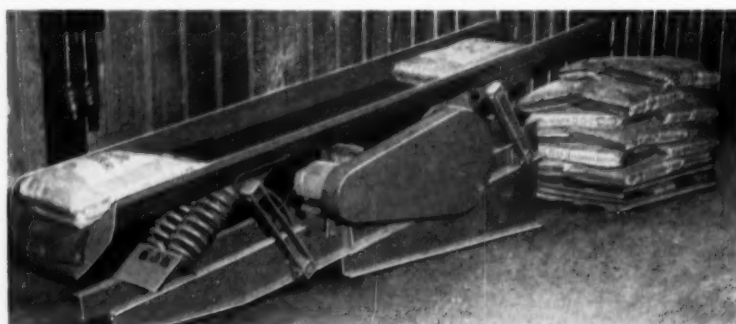
The machine is designed to be the ideal bag closer for limited or intermittent operations where requirements do not justify the purchase of a more expensive, high production unit. In addition, it is made to serve just as advantageously in large plants as a supplemental machine.

Advantages of the Class 2100 include: the machine can be operated anywhere, anytime, with no installation; it is light weight, weighing only 10½ pounds; has exclusive top

feed for greater power and production; has integral, direct-drive motor; closes bags made of cotton, burlap, jute, multiwall paper, and laminated paper; can produce stitch Types 401 or 101; and is equipped with safety protected mechanical thread cutting device. The unit is furnished prepared for either hand portable operation, suspension by top lock spring balancer, or a pedestal bracket can be supplied.

Further information on the bag closer is included in a machine circular which may be obtained by writing Union Special Machine Company, 400 N. Franklin Street, Chicago 10, Illinois.

A new vibrating bag flattener put on the market by Carrier Conveyor Corporation, Louisville. A simple, inexpensive machine, it is designed to flatten bottom-heavy bags of loose, bulk material, gently tossing the bags upward and forward with each movement of the trough. Flattening is achieved almost immediately because the material inside the bag conveys more quickly than the bag itself. It is particularly well-adapted to fragile materials such as pellets, flakes, briquets, and prilled or spray-dried materials since flattening is achieved with no product breakdown. The photo shows a ½ HP unit flattening Multi-Wall paper bags filled with granulated fertilizer at the rate of 150 bags per hour. Notice the difference in bag shape between feed and discharge ends.



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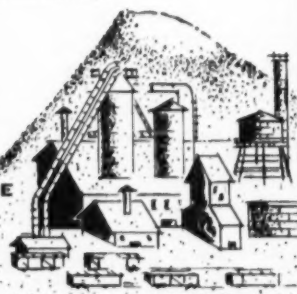
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# here's the Biggest News in the Fertilizer Industry

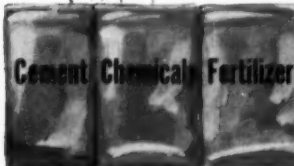


**T**his revolutionary multi-wall is a real advancement in the science of bag closure. Unlike ordinary multi-wall pasted valve bags, the Arkell & Smiths "Step-Flex" Bag is triple-sealed top and bottom to eliminate sifting of fine materials. The plies forming the multi-wall construction are staggered on the ends, and each ply on one side of the bag is pasted to the corresponding ply that it overlaps on the opposite side of the bag . . . at both top

and bottom.

This improved construction forms a positive sift-proof seal and actually makes the top and bottom of the bag even stronger than the walls!

Since the size of the orders for this new bag are increasing daily, we recommend that you let us know your requirements immediately! Write, wire or phone today.



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Manufacturing Plants at:

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*"The Oldest Name in Paper Bags"*



*P.S. There is no upcharge for the triple-sealed "Step-Flex" Bag.*



FOR ADDITIONAL INFORMATION, WRITE TO ARKELL & SMITHS, PACKAGING DIVISION, CANAJOHARIE, NEW YORK

# 'Elements vs. Oxides' Reactions Continue...

## Broadfield Condemns

M. D. BROADFIELD, General Manager  
Arkansas Plant Food Company  
North Little Rock, Arkansas

"In regard to the change in labeling fertilizers: the groups to be immediately benefitted, if any at all, would be the agronomists and chemists, but since they have been schooled under the present terms, it would not compensate for the confusion it would cause, as I see it. Certainly unless all states adopted the practice simultaneously, the confusion would be chaotic.

"In Arkansas we have educated the farmers to ask for high analysis fertilizers, and to reduce the label would of course cause them to ask for higher analysis at the same price. It would take a good deal of educational work to convince him that he is getting a 10-20-10 fertilizer with a label reading 10-8.8-8.3 or a 10-9-8.

"I think the welfare of the farmer—on whom the fertilizer manufacturer must depend for its livelihood—should be given first consideration in evaluating the changes in the educational, advertising and labelling terms of the industry. The Agricultural Colleges and Experimental Stations would have to reprint and distribute new data from textbooks and pamphlets to bring

their information up to date. This would be expensive and the cost would have to come out of their budgets which would handicap their programs.

"I don't think anyone can measure the value of such a change at this time but the discussion is of course enlightening. However, I doubt if the industry is in position to take on additional problems and expenses, and I know the farmers cannot afford to pay any more taxes than at present. The fertilizer tax money—every dollar of it—in Arkansas is needed to aid farmers in the agricultural research being carried on. The terms in which the data is expressed is not the important matter as I see it."

(From letter dated January 15, expanding newspaper quotation of January 5.)

## Nevins Supports

S. L. NEVINS, Vice President  
Olin Mathieson Chemical Corporation  
Plant Food Division  
Little Rock, Arkansas

"... I urge all segments of the industry to support state fertilizer control officials and scientific groups in their efforts to modernize fertilizer control laws. . . .

"Current practice requiring these ingredients to be expressed as oxides dates back to the early days of the

fertilizer industry when it was believed that the elements occurred in the form of oxides. Later it was found that the elements actually occur in the form of their salts. Since these salts can be of various types, scientists have long since been trying to effect the change from the oxides to the elements.

"To continue this out-dated usage is to hoodwink the farmer by making the analysis appear bigger than it does when expressed wholly as elements. Condoning this kind of farm malarkey is not becoming to our industry, to our way of life, nor to any of us as individuals.

"Changes should have been made more than a quarter of a century ago, when they were first seriously discussed. They must be made today. Putting it off in order to preserve the status quo can only prolong the inevitable. It can only tend to obscure the farmer's understanding of what he is buying.

"You know, as well as I do, of dozens of industries which have had to face similar decisions. The phonograph, bicycle, and soap industries prosper today because they embraced, not because they blocked, progress.

"I am convinced the changeover from oxides to elements will be made, whether now or later. Obtaining legislative approval of the changes in all states before the 1960 deadline proposed by control officials will be expedited if industry joins with the impressive host of agricultural groups who already have endorsed the proposals.

"The major objection to the changeover has been that it will create confusion. This objection appears to be nothing more than the normal human resistance to change, the same as resistance to high analysis versus regular grades was experienced. The proposals in fact are a move toward simplification that will eliminate confusion.

"There was negligible confusion when the requirement for expressing nitrogen was changed from  $\text{NH}_3$  to N. There is no confusion regarding secondary and minor elements, which are expressed in their elemental form.

"If the argument is that the farmer will be confused, let us not underestimate his intelligence. If he can absorb and use very technical information on pesticides and veter-

## NPFI Executive Committee Resolves—

The Executive Committee of National Plant Food Institute adopted a resolution December 14 which "looks with disfavor" on a proposed change in reporting the phosphate and potash content of fertilizers in the elemental rather than the oxide form.

Action by the committee was taken following a poll of the Institute membership. Institute members were asked whether they favored, opposed, or were neutral to the proposal of "changing the expression of  $\text{P}_2\text{O}_5$  and  $\text{K}_2\text{O}$  to P and K, respectively."

The text of the resolution adopted by the Committee follows:

"RESOLVED That the Institute be authorized to publish the results of the membership poll on the oxide vs. elemental issue, and that in view of the results, that the Institute looks with disfavor upon the proposed change.

"RESOLVED FURTHER That the Institute be authorized to act as a clearing house and make available to all parties, including state officials and state legislatures, any information on the subject."

The Institute poll on the oxide vs. the elemental issue revealed that, of those reporting, 67 per cent were opposed to changing the present method of reporting, and that 17 per cent favored the proposed change. The poll also showed that 16 per cent of the Institute members reporting favored a neutral position.

The poll on the oxide vs. elemental issue was authorized by the Executive Committee following action by the Association of American Fertilizer Control Officials which proposed a change in the reporting of phosphate and potash in connection with a model state fertilizer law.

# ...More Opinions on Proposed Label Change

inary medicines, as he now must do, a change to simpler terminology in fertilizer formulas should not challenge him.

"If we ask ourselves honestly, 'whose advice does the farmer really take?' we must admit in most cases he will follow the recommendations of the very group of scientists who are recommending these changes. The research work of these scientists running into millions of dollars annually, provided by the taxpayers, is further enhanced by grants in aid from our industry. Can we criticize the farmers for not following their advice and at the same time turn about ourselves and disregard their suggestions?

"It is true that an educational campaign will have to be undertaken by officials and agronomists to inform the farmer regarding the changes, once they are made. Industry will join in that campaign, which I do not believe will be either long or difficult.

"In fact, such a campaign will increase the farmers' awareness of his need for fertilizer. The industry stands to benefit. I predict that fertilizer manufacturers will experience the greatest boom in sales in their history once the confusion of outdated labeling practices is eliminated. The very change itself will focus attention favorably on the products of our industry, and alert the farmer to his real needs.

"Contrary to apprehension that appears to be voiced by some opponents to these changes, there will be no raw material or manufacturing problems which do not already exist. Actual formulations would remain just as they are, with only slight changes up or down to eliminate fractions. New lists of approved grades can always be expected.

"There is no reason for price increases based on the changeover. All ingredients will be the same, cost the same per unit, and should sell for the same unit price. Conversion costs are unchanged. It is completely practical to make these changes now.

"The changes will simplify the teaching of fertilizer technology by eliminating the present difficulty of explaining the meanings of grades and ratios.

"Unanimous and hearty support of these proposals is important to the industry's growth and development.

Industry stands to gain so appreciably that I am surprised such support has not come spontaneously. Moreover, the results of these changes will benefit the farmer, and therefore the nation. I urge all industry people to re-examine the advantages of supporting these proposals. I urge that industry-wide approval to the proposals be expressed, thereby giving a vote of confidence to those scientific agricultural leaders who, with the best interests of the farmers at heart, are recommending these logical changes in nomenclature."

*(From statement released January 2.)*

## Kingsbury Opposes

G. H. KINGSBURY, President  
Kingsbury & Company, Inc.  
Indianapolis, Indiana

"The proposal of the American Association of Fertilizer Control Officials to change the guarantees of plant food from an oxide basis to an elemental basis demonstrates either:

(a) Lack of understanding of the problems presented to the fertilizer industry, or

(b) Disregard for these problems. "... If we are forced to reduce our guarantees to conform to the elemental basis the average farmer will think he is being 'gypped.' He is not going to understand why we are 'lowering' our guarantees and, at the same time, increasing prices. We, in the fertilizer industry, are the ones who will have the explaining to do, not the scientists. ...

"The AAFCO may not realize it but many distributors are about 'fed up' with handling fertilizer anyway, and a move such as this could easily be 'the straw that broke the camel's back.' It is this speaker's considered opinion that this proposed change, if adopted, would cause many dealers to discontinue handling fertilizer. Replacement of these distributors would mean increased sales expense to the fertilizer industry and eventually this would have to be reflected in increased prices to the consumer. ...

"Obviously, we will have a lot of explaining to do if we lower guarantees and, at the same time, raise prices 10% to 13%!

"And where do the agronomists fit into this picture with their recommended grades and plant food ratios? It has only been in the past few years that the agronomists in

the Middle West have been able to 'get together' on a list of grades acceptable to all. Now it is proposed that these grades and ratios be thrown out the window ... agronomists will be asked to start all over again. Is this fair? Is it necessary? Furthermore, all text books mentioning grades would have to be re-written.

"There are many phases to the agronomic problem. One is the concentration of salts. Until the implement people come up with better fertilizer attachments I am wondering if we haven't gone far enough on concentration. In fact, I sometimes feel that we are getting the cart before the horse. ...

"Please do not misunderstand me. Your speaker has always believed in increasing the plant food content whenever it was practical to do so. Long before Purdue or any other State University began advocating high analyses we were already making them and selling them. ... We hope we will never be accused of blocking progress but let's be sure that it IS progress. Don't forget that, if left alone, competition will take care of the increase in plant food but it will do it gradually, within the framework of practicality as to raw materials, manufacturing methods, etc. It will come by evolution rather than revolution, which is almost invariably the sounder way. ...

"In investigating the history and background of this movement it appears that it was initiated by a group of scientists with the best of intentions and no ulterior motives but nevertheless by men without much, if any, practical experience in the manufacture of fertilizer. Probably everyone in this room has, at one time or another, had an idea which looked very good on paper but which didn't pan out in practical application. I have had many such ideas and I call them 'brainstorms'. I am not opposed to brainstorms because I am not opposed to thinking. Brainstorms stimulate thinking and even if they don't work out they serve a useful purpose. The only danger with a brainstorm is that the originator or proponent may become obsessed with the rightness of his idea to the point of being blind to argument against it.

"While the group which initiated

*(Concluded on page 70)*

## CF Staff-Tabulated TONNAGE REPORTS

FERTILIZER TONNAGE REPORT (in equivalent short tons) Compiled by Cooperating State Control Officials and Tabulated by COMMERCIAL FERTILIZER Staff

STATE	December		November		October		July-Sept. Qtr.		January-June		YEAR (July-June)	
	1956	1955	1956	1955	1956	1955	1956	1955	1956	1955	1955-56	1954-55
Alabama		16,514 <sup>1</sup>	33,110	35,602	53,799	52,366	73,427	62,490	813,104	846,735	1,029,030	1,114,238
Arkansas		7,180 <sup>1</sup>	7,485	5,836	10,719	13,716	33,156	33,567	299,172	270,894	359,471	330,781
Georgia	49,063	64,682	88,232	70,201	31,456	35,346	84,808	80,739	993,954	1,047,875	1,244,422	1,273,445
Kentucky		14,838 <sup>1</sup>		8,287 <sup>1</sup>	36,595	34,965	38,271	33,388	441,481	431,024	529,600	522,410
Louisiana	8,295	7,415	12,740	14,062	25,944	15,019	24,150	22,849	214,343	232,781	273,688	310,848
Missouri		46,863 <sup>1</sup>	32,870	30,272	90,574	115,485	177,012	164,002	450,102	414,503	804,441	682,690
N. Carolina		53,152 <sup>1</sup>	43,644	35,352	62,001	74,504	67,264	62,174	1,424,267	1,566,158	1,649,449	1,830,633
Oklahoma		1,700 <sup>1</sup>	6,489	3,876	20,384	23,619	25,166	40,347	65,854	63,799	135,396	122,204
S. Carolina	23,216	24,259	24,993	26,346	31,701	27,987	43,019	41,355	743,670	796,111	863,617	928,715
Tennessee	8,298	6,267	44,411	30,227	54,882	58,596	58,205	59,120	378,676	355,966	515,551	523,349
Texas	31,736	28,740	36,476	40,044	38,202	31,494	71,436	76,141	377,805	375,176	566,399	588,062
California		(reports compiled quarterly)					181,386	173,411	639,377	603,657	1,001,554	922,127
Virginia		(reports compiled quarterly)					75,566	71,064	599,111	636,585	761,820	795,770
Indiana		(reports compiled semi-annually)							807,918	873,966	1,063,049	1,158,960
Iowa		(reports compiled semi-annually)							231,873 <sup>1</sup>			
N. Hampshire		(reports compiled semi-annually)							13,168 <sup>1</sup>			
Washington		(reports compiled semi-annually)							103,288	124,186	152,037	182,348
TOTAL	120,608	131,363	330,450	291,818	456,257	482,897	952,866	920,647	8,352,122	8,639,506	10,949,524	11,286,580

(not yet reported)

\* Not compiled

<sup>1</sup> Omitted from column total to allow comparison with some period of current year.

## MARKETS

**ORGANICS:** Movement and demand for fertilizer organics continue steady. Prices are also steady for Leather Nitrogenous Tankage which, effective January 1st, range from \$3.25 to \$4.50 per unit of Ammonia f.o.b. production points.

Activated Sludge prices are unchanged at \$2.95 per unit of Ammonia and 50c per unit of APA, bulk, f.o.b. Midwest production point, with another production in the Southwest priced at \$3.00 per unit of Nitrogen and 50c per unit of APA, bulk.

**CASTOR POMACE:** This market continues extremely tight with last sales made on a very limited quantity for January/February shipment at \$45.50 per ton, in bags, f.o.b. New Jersey shipping point.

**DRIED BLOOD:** The Chicago market recently advanced to a basis of around \$5.50 per unit of Ammonia for sacked unground Blood. The New York market is quiet at slightly lower basis.

**POTASH:** No unusual developments in this market. Prices remain firm and unchanged for domestic material and material is picking up in seasonal dimensions.

**GROUND COTTON BUR ASH:** Supply and demand continue in

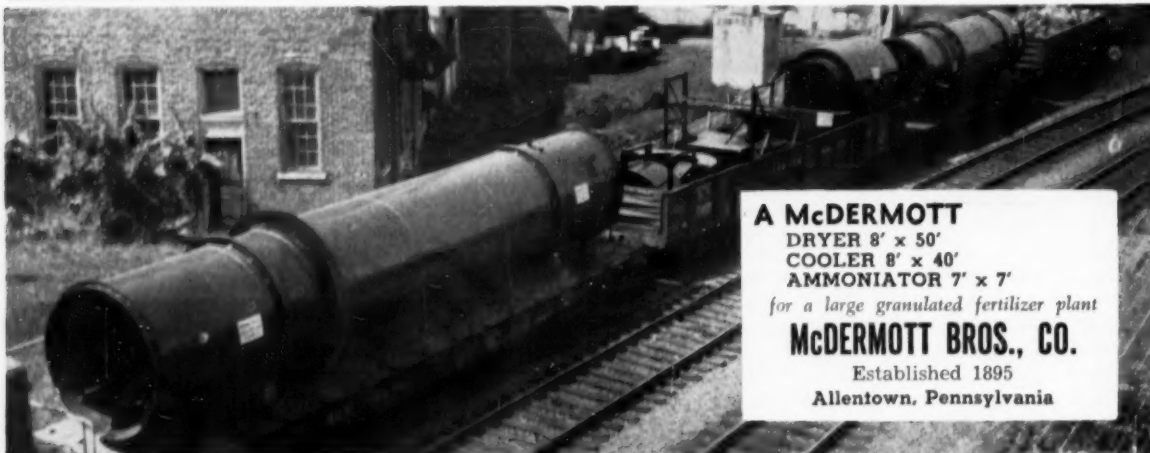
good balance for this source of Potash which is primarily in the form of Carbonate of Potash. Current analyses are running about 38% to 40% K<sub>2</sub>O.

**SUPERPHOSPHATE:** Production of concentrated superphosphate has been running behind figures for the same period last year but prices continue firm and demand tending to increase. Normal Superphosphate prices are steady and movement picking up.

**PHOSPHATE ROCK:** No unusual activity in this market with prices firm and stocks in comfortable position.

**NITRATE OF SODA:** Imported Ni-

(Concluded on page 70)



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 DRYER 8' x 50'  
 COOLER 8' x 40'  
 AMMONIATOR 7' x 7'  
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 Established 1895  
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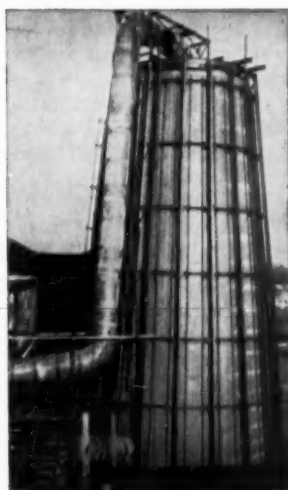
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## LABELS

(Continued from page 67)

this movement apparently had no ulterior motive it is felt by many people in the industry that certain producers of DAP and  $H_3PO_4$  have siezed upon the idea to promote the use of their own materials. Whether this is true or not, I do not know, but I am convinced that the original group had no deliberate intention of promoting the use of one material over another. However, this factor does cloud the issue and it should, in my opinion, be threshed out, in the open, before any further steps are taken. . . .

"... the resolution adopted by the AAFCO in Washington, D. C., October 19, 1956, reads as follows:

**THEREFORE BE IT RESOLVED** that the Association of American Fertilizer Control Officials recommends to the respective States that it is essential to American agriculture for each state law to be amended to permit by July 1, 1960, such change on a gradual but uniform basis as provided in the Model State Fertilizer law.

"The word 'essential' here reminds me of Mark Twain's remark when informed that a certain newspaper had reported his death. 'This,' said Twain, 'is a slight exaggeration.'"

(From paper presented at Indiana Fertilizer Conference, November 27, 1956.)

## Chemical Packaging Builds \$100,000 Branch

The Chemical Packaging Company, Savannah, Ga., has begun construction of a \$100,000 branch bag-manufacturing plant at Louisville. Expected to be in operation in the spring, the plant will employ 100 to 150 people and will produce heavy multi-walled paper bags.

## MARKETS

(Continued from page 68)

trate of Soda was reduced in price effective January 1st which is the second reduction for this season. New price is \$44.50 per ton in bulk and \$48.00 per ton in bags f.o.b. cars or trucks at sellers' warehouses at Atlantic and Gulf ports.

**CALCIUM AMMONIUM NITRATE:** Effective January 1st, prices of this 20.5% Nitrogen material were generally reduced by importers and domestic producers to a basis of \$44.00 per ton bulk and \$48.00 per ton bagged f.o.b. Eastern seaboard production point for domestic and f.o.b. Atlantic and Gulf ports for Imported material.

**GENERAL:** Movement of mixed fertilizers in the Southeast is beginning to expand and within the next 30 days movement of certain nitrogenous productions for direct application will be in much greater volume.

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